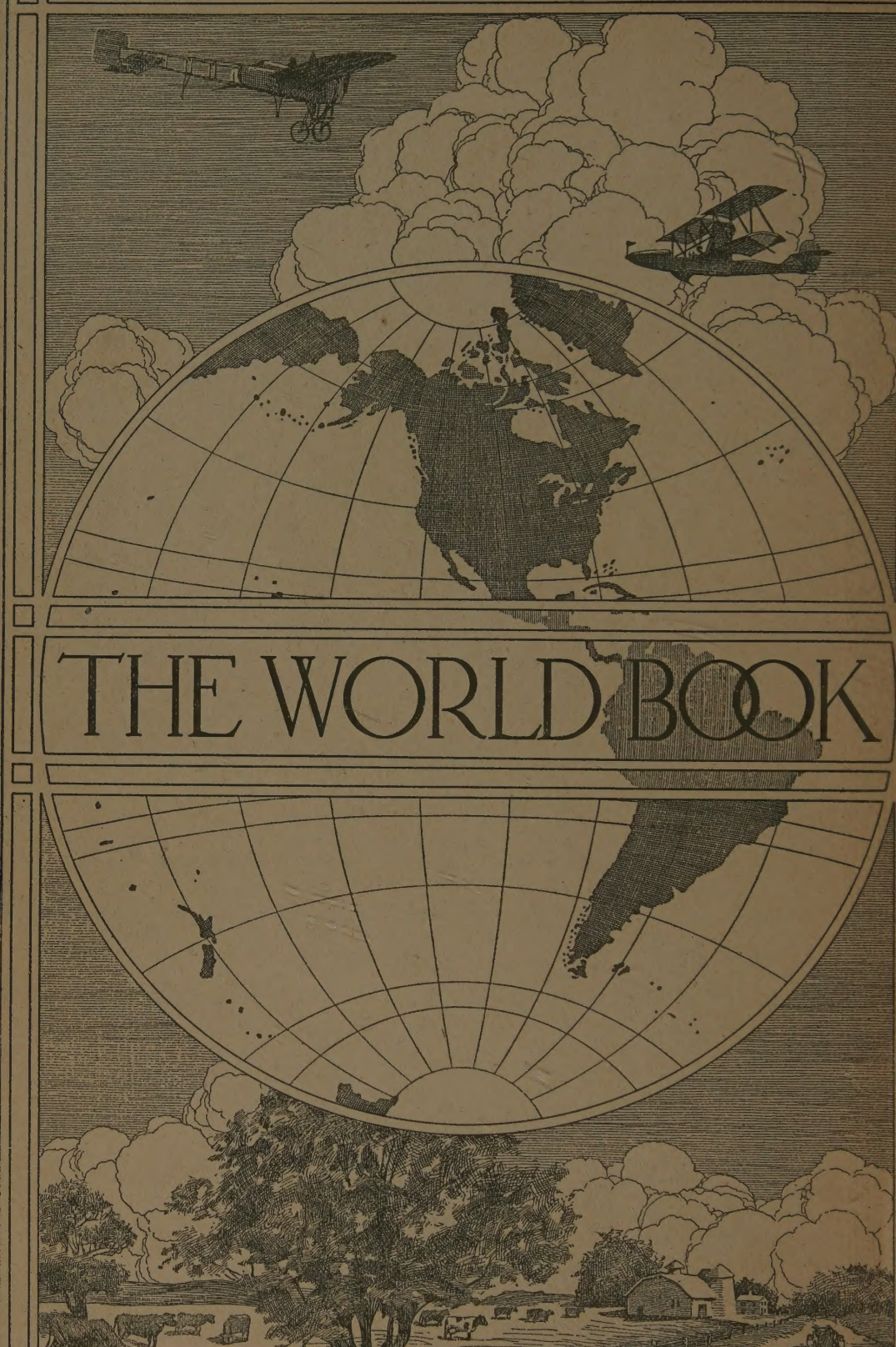
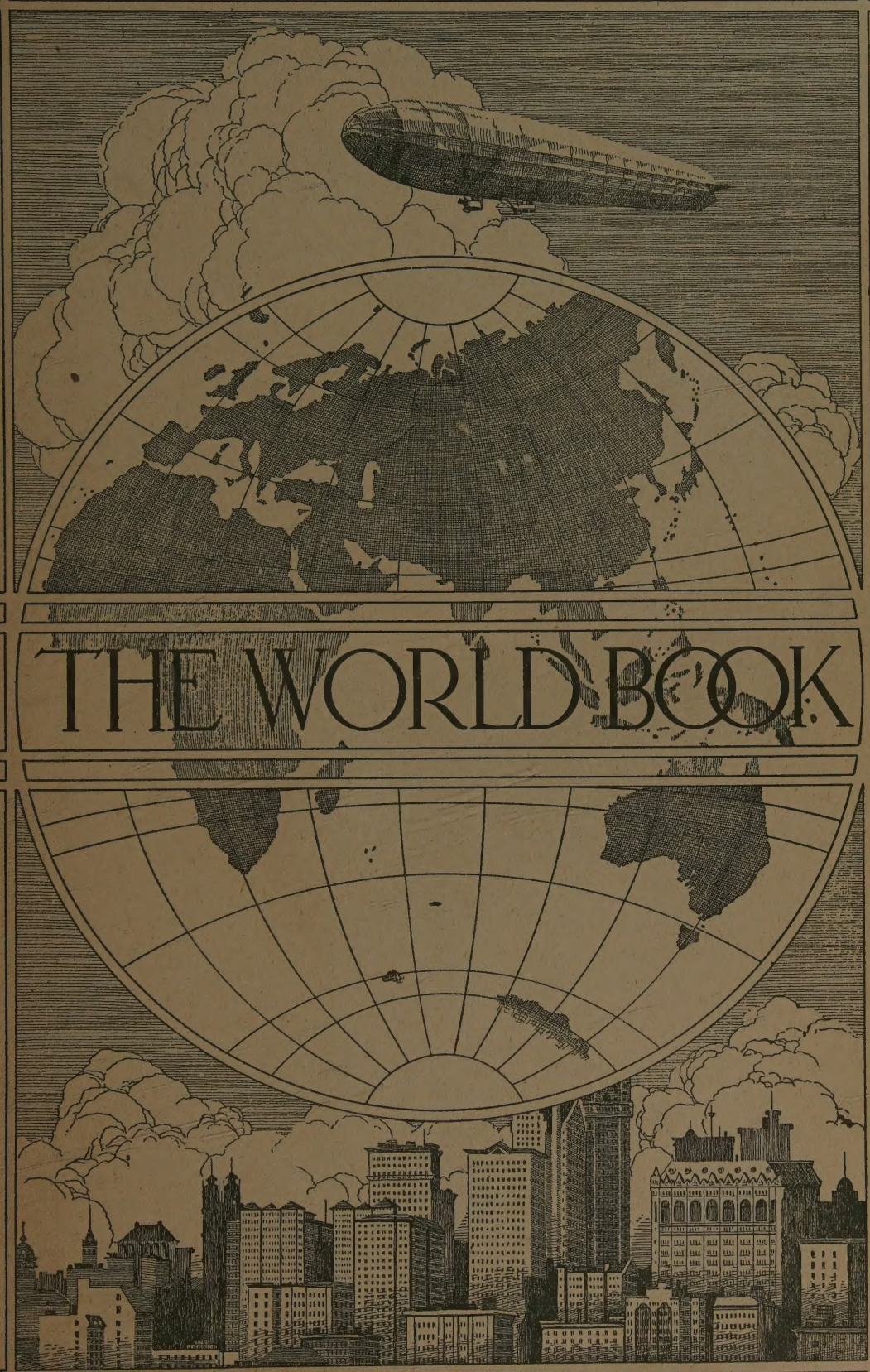

THE WORLD BOOK



# THE WORLD BOOK

# THE WORLD BOOK

ORGANIZED KNOWLEDGE IN STORY AND PICTURE

TRADE MARK REGISTERED


EDITOR-IN-CHIEF

M. V. O'SHEA

DEPARTMENT OF EDUCATION, UNIVERSITY OF WISCONSIN
MADISON, WISCONSIN

EDITOR

ELLSWORTH D. FOSTER

ASSOCIATE EDITOR NEW PRACTICAL REFERENCE LIBRARY; AUTHOR OF CYCLOPEDIA OF CIVIL GOVERNMENT

EDITOR FOR CANADA

GEORGE H. LOCKE

LIBRARIAN, TORONTO PUBLIC LIBRARY, TORONTO, ONTARIO

ASSISTED BY ONE HUNDRED FIFTY DISTINGUISHED SCIENTISTS, EDUCATORS, ARTISTS AND LEADERS OF THOUGHT IN THE UNITED STATES AND CANADA


*In Ten Volumes* *Volume Ten*


1919

W. F. QUARRIE & COMPANY

TORONTO CHICAGO NEW YORK

Copyright: 1917: 1918: 1919: Hanson-Bellows Publishing Company

THE WORLD BOOK
ORGANIZED KNOWLEDGE IN STORY AND PICTURE
TRADE MARK REGISTERED
VOLUME TEN

**TROY**, N. Y., an important distributing point and industrial center, noted especially for the manufacture of shirts, collars and cuffs. It is the leading center in the United States for this industry. Troy is the county seat of Rensselaer County, and is situated in the central-eastern part of the state, on the east bank of the Hudson River, at the head of tidewater navigation, opposite the main outlets of the Erie and Champlain canals (see NEW YORK STATE BARGE CANAL). Albany, the state capital, is six miles south, and New York City is 151 miles south. Steamers and barges ply regularly between Troy and New York, and there is water communication with the Great Lakes through the Erie Canal and with Canada through the Champlain Canal. Railway transportation is provided by the New York Central, the Delaware & Hudson and the Boston & Maine railroads, and electric lines afford passenger and freight service to near-by cities. Irish, Germans, English, Italians and Russians comprise a large part of the population, which in 1910 was 76,813; in 1916 it was 77,916 (Federal estimate). With contiguous communities there is a centralized population of 135,000.

**Location and Description.** The city lies for the most part on a narrow strip of land extending along the river for several miles and eastward to hills that rise in some places to a height of about 500 feet. Four bridges connect it with Watervliet, Cohoes, Green Island and Waterford, on the opposite side of the river; that to the last-named city, built 1804, was the oldest covered wooden bridge in the United States. It was constructed for wagon and foot traffic, but is now used for electric car service. At the shore River Street follows the winding course of the river, and the intersecting streets, which are regularly laid out, form a number of triangles; in one of these is a fine soldiers' and sailors' monument, nearly 100 feet high. The more attractive residential districts and Prospect Park, which covers more than eighty acres, occupy the heights, which afford a beautiful view of river and valley. Oakwood Cemetery (400 acres) has an admirable site about 300 feet higher than the lower city. It contains the Earl Crematory and is the burial place of General Wool, of Mexican War fame, and of General Thomas, known in history as the *Rock of Chickamauga*.

**Institutions and Buildings.** In addition to its public school system, the city has Emma Willard Female Seminary, for the higher education of women, including the Gurley, Plum and Sage Memorial buildings; it was established in 1825 as the Troy Female Seminary and was among the first institutions of its kind in the United States. Rensselaer Polytechnic Institute is a famous school of civil engineering, and the city has also Russell Sage College of Practical Arts. There are four asylums for orphans, three hospitals, a home for the aged and a reformatory. The noteworthy buildings are the granite post office, courthouse, city hall, the new union station, a white marble public library, and a fine savings bank building; the latter contains a large music hall. Among recent structures of importance are fine Y. M. C. A. and Y. W. C. A. buildings.

**Manufactures.** At Troy the state has constructed a dam across the Hudson River, and the water power thereby obtained, with that of the Wynantskill and Poestenkill rivers, each having a fall of about 200 feet, offers inducements to manufacturers, and there are a great variety of plants, some of which are among the largest of their kind in the United States. The collar-and-cuff industry gives employment to more than 20,000 people, and has an annual output of $18,000,000, and special machinery is made for it in Troy. Until 1910 ninety-eight per cent of the men's collars made in the United States came from this city. One of the largest factories in the Union for making mathematical instruments is located here; the iron products are known for their superior grade, and the factories and furnaces are the largest in the Eastern states. Troy makes the

famous machine-made horseshoe, invented by Henry Burden; guns for the United States coast defense are made in the arsenal at Watervliet.

**History.** The site of Troy was known as Van der Heyden's Ferry and as Ferryhook until 1789, when the town received its present name. The appellation "Uncle Sam" was first applied to the United States government in Troy during the War of 1812, it is claimed, when large quantities of provisions for the American army, labeled "U. S.," were sent from this city. Samuel Wilson, familiarly called "Uncle Sam," was the official inspector, and the provisions soon became known as "Uncle Sam's." In 1816 the city was incorporated, and in 1901 it annexed Lansingburg. J.S.C.

Consult *New Troy*, issued by the Troy Chamber of Commerce; Weise's *Troy's One Hundred Years*.

**TROY WEIGHT,** a standard system used in weighing gold, silver, platinum, jewels and coins. The term *Troy* is derived from *Troyes*, the name of a French town that was an important commercial center in the fourteenth century. Like many other towns of that period, it had its own system of weights and measures, and the *pound of Troyes* became widely known. The derivative, however, came to have no connection with the name of this particular town, but was used to designate a system in which the pound contained twelve ounces and the ounce was equal to twenty pennyweight (see table in DENOMINATE NUMBERS, page 1765). The Troy pound and the apothecaries' pound are alike in having 5,760 grains each. The pound avoirdupois, however, is equal to 7,000 grains. The grains in all three systems are equal.

**TRUMBULL,** JONATHAN (1710-1785), an American patriot from whom was derived the name "Brother Jonathan," as typifying the United States. He was born in Lebanon, Conn., was graduated at Harvard in 1727, and after studying theology was licensed to preach. Afterward he adopted the profession of law, and in 1739 was elected speaker of the general assembly of Connecticut, subsequently becoming judge of the county court; from 1766 to 1769 he was chief justice of the superior court. For fourteen years, from 1769 to 1783, Trumbull was governor of Connecticut colony, and Bancroft, the historian, said of him that he was possessed of all the virtues of a rural magistrate. He took a prominent part in the events leading to the Revolutionary War, and was the chosen friend and counselor of Washington, who placed great confidence in him. The latter frequently said, when troubled about some important matter, "Let us hear what Brother Jonathan says." In time the phrase "Brother Jonathan" was used as a nickname for the United States.

**TRUMPET,** a wind instrument which has a prominent place in military organizations. Its tone is brilliant and penetrating. The cavalry trumpet, used for sounding calls to the mounted soldiers, consists of a metal tube bent twice, having a cup-shaped mouthpiece at one end and a flaring bell at the other. As the player blows into the tube the vibrations of his lips produce the various tones. The fundamental pitch of any one instrument depends on the length of the tube, but variations in the force of the breath make possible a considerable range of notes. There are numerous modifications of the cavalry trumpet. A smaller instrument made on the same principle is the bugle, used in sounding calls for the infantry (see BUGLE). The orchestral trumpet has double tubes sliding upon one another, as in case of the trombone, and the key bugle is provided with finger holes and keys. There is also a valve trumpet, which has a tone much like that of the cornet. Music for the trumpet is always written in the treble clef.

**TRUMPET-FLOWER,** a climbing plant of the bignonia family. See BIGNONIA.

**TRU'RO,** the county town of Colchester County, Nova Scotia, in the central part of the province. It is on the Salmon River, about two miles east of the head of Cobequid Bay, an arm of the Bay of Fundy. Truro is an important railway center, served by both the Intercolonial and Canadian Pacific (Dominion Atlantic) systems. The railways from Truro spread in four directions, thus entitling it to its popular name, "the hub of Nova Scotia." Population in 1911, 6,107; in 1916, about 7,000.

Truro's excellent railway facilities are utilized by numerous manufacturing establishments, including knitting mills, foundries, woodworking plants, and factories for making shells, mattresses, hats and caps and condensed milk. The output of knitted underwear is worth about $1,000,000 a year, and of hats and caps nearly half as much.

The town is noted for its educational institutions, among which are the provincial normal college, the provincial college of agriculture, and the Truro, or Colchester, academy. The academy is the town high school, but is also free to all children resident in the county, provided they can pass the entrance examinations. The buildings of these three institutions are

among the conspicuous features of the town, as are also the local Dominion building, completed in 1884 at a cost of $75,000, the town hall or civic building, erected in 1913 at a cost of $55,000, and the Canadian Government Railways depot, erected in 1914 at an expense of $200,000.

Victoria Park, covering a thousand acres, is a pleasure ground of great natural beauty. Its hills of red sandstone surround a roomy glen or valley, which gradually contracts till it becomes a rocky gorge less than a hundred feet wide and more than a hundred feet deep. Through the valley flows Lepper Brook, which at the narrowest part of the gorge forms the Waddell and Howe Falls, before it joins the Salmon River on the outskirts of the town.

**TRUST,** in economics, the name commonly applied to a great industrial or business combination. By virtue of its size it possesses either a complete monopoly or sufficient control of the sources of production to regulate to some extent the conditions of production, the market and prices. The word *trust* should not be applied to legal monopolies or to natural monopolies; it applies only to monopolies built up by combinations of capital.

**Pools.** Trusts are distinctly of American origin, and their development began with the close of the War of Secession. The first form of combination was the *pool,* which was not technically a trust. A pool was merely an agreement whereby a number of producers divided territory, or restricted their output, or otherwise eliminated competition. Each producer, however, retained the management of his own factory. Pooling agreements were a reaction from a period of intense competition; the easiest way to avoid disastrous competition was to make some such agreement with other producers.

Pools have become numerous in Europe, operative except in stress of war, particularly in Great Britain, France, Austria and Germany, where they usually take the form of an agreement restricting production. Many of the pools maintain a single selling organization, which is, in effect, a sort of clearing house. In these European countries pools have generally flourished, even in France, where the law against monopoly created by unfair means is very strict. In Germany, indeed, the pools have been encouraged to feel that the law and the government are not hostile to them. Pools in iron, coal and sugar have been notably successful.

In the United States, the system of pools reached its highest development in agreements between railways, although pools existed in other industries. Railway pools may divide the territory, the traffic or the income from traffic. The development of these pools, unfortunately, coincided with the spread of the granger movement and an almost universal attitude of distrust towards all railroads. The courts held that pooling in any form was illegal under the common law, and in 1887 the Interstate Commerce Act declared railroad pooling illegal. Many students of the subject are inclined to believe the prohibition of pooling to be unwise, and that pooling under government supervision is really desirable.

**The Voting Trust.** The fact is that about the year 1880 pooling was generally viewed as contrary to law. The courts refused to enforce such agreements, on the ground that they were in restraint of trade, and in a number of cases ordered the dissolution of pools. A new method of combination had to be devised; this was the *trust,* or, as it is often called to distinguish it from the general term, the *voting trust.* Under this system the stock of several corporations was assigned to one board of trustees, who voted the stock and thus controlled the affairs of all the companies. The stockholders, in return for their stock, received trust certificates, which could be transferred like ordinary certificates of stock. The Standard Oil Company, founded in 1882, was the first to use this form of organization; the word trust as first applied to this company has become a general term of wider meaning. But this form was not perfect; it left abundant opportunities for waste and mismanagement. Furthermore, the Sherman Anti-Trust Law of 1890 was a danger signal (see, below, subhead *Trust Legislation*). So still another form was developed, which was called the *holding corporation.*

**Holding Corporation.** In this form of organization a new company was organized with sufficient capital to buy the controlling interest of the independent companies. The officers of the new corporation, therefore, could control the policies of all the *subsidiary* companies. All the great trusts, including the United States Steel Corporation, the Standard Oil Company and the International Harvester Company, were organized on this plan. Occasionally, after such a holding corporation had purchased control of a number of smaller companies, the latter would be dissolved, leaving only the one great company. Even this form, however, did not

protect the organizers from government interference under the terms of the Sherman Law.

Above are the facts of the development of trusts. A number of questions naturally arise at once: (1) What were the causes of great combinations of capital; (2) what are the advantages of such combinations, and (3) what the disadvantages; (4) what has been done to limit the power of trusts; and (5) what is their probable future?

(1) **Causes of Trusts.** Trusts are a logical and entirely natural development of the factory system and of general industrial conditions. In earlier days there were natural monopolies, such as mines, and there were legal monopolies, such as guilds. But the modern capitalistic trust is a consequence of industrial conditions of the nineteenth century. With the development of the factory system, it was found that most commodities can be produced more cheaply on a large scale than in small quantities. As the factory in itself was the result of combination, it did eliminate competition between individual producers. But in the course of years there arose a competition between factories. This competition was due to expanding markets, themselves the result of better means of communication and transportation. The factory system required large investments of capital which could not easily be withdrawn. For example, to construct a great sugar refinery might cost $200,000; if for any reason the sugar refining business failed to pay, it would be exceedingly difficult to remodel the building and its equipment for some other business. For this reason, many manufacturers continued to operate their plants without profit, or even at a slight loss, rather than lose the entire value of their property. But competition which has such disastrous results cannot last. The many economies which would result from combination were clear; duplication of plant, of sales organizations, of advertising, would all be avoided. The most efficient manager could supervise all the plants, instead of only one plant, as would be possible under competition, and there could be real standardization throughout the whole combination.

*Secondary Causes.* An influence often not noted by the public is the desire of the promoter or organizer to make a profit for himself. Seeing the economic advisability of combination in many instances, the promoter is the man who brings together the competing interests. For this service he usually receives a large sum in cash or stock. Similarly, the banker or financier who *underwrites* the stock of the new combination, in return for the risk he assumes makes a large profit.

It is not an exaggeration to say that the possibility of promoter's or underwriter's profits has been the motive power in the organization of more than one trust—granted, of course, that there was economic justification for the combination.

Government favor has often been an important influence. In the United States, the protective tariffs, shielding home producers from foreign competition, have made possible increased profits and have thus indirectly led to combination. Patents, trade-marks and other privileges have exerted a similar influence.

(2) **Advantages.** The advantages of trusts might almost be placed among the causes, for they are almost all on the side of capital. From the point of view of capital, a trust is almost ideal. This is particularly true if an industry is of such a nature that its products are uniform in quality; for example, sugar, kerosene and salt. The quality of these products is easily tested, and the only difference between them is likely to be a brand or trade-mark. Competition in such industries is merely a question of cutting prices.

The chief advantages to the producer may be classed as manufacturing and marketing. In the manufacturing, a large organization or trust can buy its supplies in great quantities at a lower net cost; it can avoid the duplication of equipment and staff, and can redistribute both men and machines to the best advantage. Take, for example, the United States Steel Corporation. One of its subsidiaries makes nothing but nails and screws, another specializes in steel nails, a third in steel for buildings. One of the Standard Oil Company's subsidiaries manufactures nothing but vaseline. Such specialized organization is highly economical. The work can be divided among the various plants to insure a maximum efficiency for the entire organization. Another advantage is the use of by-products, the classic example being a great pork-packing plant. It is a familiar saying that nowadays the only part of the pig not economically valuable is the squeal.

The advantages in marketing are equally important. First, a trust can divide the market among its constituent parts, thus accomplishing what pools formerly did. It then reduces its selling cost by eliminating salesmen and advertising. It is obvious that it is cheaper for the International Harvester Company to

send out one salesman who sells all its products, than it was formerly for the individual concerns which entered the combination each to send out salesmen in competition with the others. A large organization, again, is able by its very size to fill large orders on short notice, and thus hold the favor of its customers. It can afford always to keep a complete stock, where the smaller independent concern can keep only a partial stock. Another advantage is the opportunity to please a customer by carrying a stock of allied or by-products. To manufacture them is usually a saving, and to sell them, a profit. The same principle is seen in daily operation in the department stores of great cities, although such stores are by no means trusts.

(3) **Disadvantages.** The disadvantages or evils of an industrial system dominated by trusts are serious. From the fact that a combination is able to effect great saving in manufacturing and in marketing, it might be supposed that lower prices of finished products would result; on the contrary, these have usually been kept at their former levels and occasionally have been increased. Again, instead of paying larger wages out of their increased returns, the great trusts have even forced wages lower than would be possible in smaller, independent corporations. A strike in one plant may be met by closing down the plant affected and filling all orders from some other factory. The very greatness of the trust has been a weapon with which to coerce labor, and labor has found it necessary to organize in opposition. Another serious evil is the loss to investors which frequently results from stock manipulation either before or after the organization of the trust. So pronounced is this evil that the directors of some great trusts are noted for the skill with which they gamble in the stock market, rather than for the success of their organization. Trusts have also been known to resort to bribery of public officials, thus demoralizing the government.

From this statement of the evils of trusts it must not be understood that all trusts are "bad." There are "good" trusts and "bad" trusts—the bad trusts making unfair use of their power and advantages. The International Harvester Company is perhaps the best example of a good trust, whose heads have really considered themselves trustees not only for their stockholders and their employees, but for the general public.

Two of the most frequently repeated criticisms against trusts have always been that they are, or would like to be, monopolies, and that they discourage business activity and independence among individuals. It is estimated that over one-fifth of the total industrial capital of the United States is controlled by trusts. But a monopoly is not, in and of itself, considered a bad thing. For example, most people are agreed that all the telephones of a large city should be under one management, and also all street railways. In some other industries, such as sugar refining, a virtual monopoly is not so obviously desirable, but it has certain advantages. The real question to be considered, however, is not whether trusts are good or bad, but whether anything can be done to restrict their powers to legitimate channels. If the small producer can rest assured that the trust will compete fairly, there is no reason why he should not continue his business without danger.

(4) **Trust Legislation.** Public opinion has sometimes exercised a little influence on the great trusts, but the only permanent control is through legislation. Great Britain and other European countries have laws on the subject, but they are, on the whole, not so hostile to large combinations as is the United States. A Canadian act of 1910 recognizes combinations as natural and legal, but it provides remedies for abuses. At the request of six persons a Canadian court must consider any abuses complained of; if there seem to be good grounds for the complaint the court reports to the Dominion Minister of Labor, who organizes a board of inquiry. The board has full powers to get all necessary evidence, and its findings are made public. Six remedies are offered: (1) the influence of public opinion; (2) removal of tariff advantages; (3) cancellation of patents; (4) revocation of licenses; (5) withdrawal of subsidies; (6) fines and imprisonment, if the findings of the board are ignored. Thus there is a remedy suited to almost every conceivable case.

In the United States a sharp line must be drawn between trusts doing a business wholly within a state and those operating in several states. Nearly every state has, since 1880, passed special anti-trust laws prohibiting agreements or combinations in restraint of trade or tending to create monopolies. Every state possesses certain powers over a trust, because it alone can grant the right of incorporation; it may impose any terms it pleases as a condition to doing business within its limits, provided always that such conditions do not interfere with interstate commerce. And now the heart

of this subject is laid bare. Most of the trusts are engaged in interstate commerce, and the restrictions placed on them by the individual states are of little effect. The body which possesses the greatest powers over the trusts is the Congress of the United States.

*Sherman Anti-Trust Law.* The first important law of an anti-trust character was the Interstate Commerce Act of 1887, but this law applied only to public carriers. The Sherman Law of 1890 applied to all interstate trade. Aimed directly at the growing powers of trusts, it declared that any combination, in the form of voting trusts or otherwise, or any conspiracy in restraint of interstate or international commerce, is illegal; also that all such combinations must be dissolved by the courts, if proof of violation of the law is offered by the Attorney-General of the United States. The maximum penalty for violations is a fine of $5,000 or a year's imprisonment, or both, for each offense. Furthermore, any person "injured in his business or property" by illegal acts of a combination may bring suit against it for three times the amount of damages sustained by him. The law expressly states that the term *person* includes corporations.

Under the terms of this law there have been about 150 suits against corporations, some successful, some unwarranted. One case of general public interest was the case of the Northern Securities Company, which had been formed to assume control of the Great Northern and the Northern Pacific railways. These were competing lines, and the Supreme Court in 1904 held that a combination of them was illegal. A second great case involved the Standard Oil Company. This suit was begun in 1906, and was finally settled in favor of the government in May, 1911, dissolution of the company within six months being the court's order. Other important suits decided in favor of the government resulted in the dissolution of the American Tobacco Company (the tobacco trust), the Du Pont de Memours Co. (powder trust), and the International Harvester Company (harvester trust).

Also as the result of the government's efforts the Union Pacific Railway was compelled to sell the control of the Southern Pacific; the American Telephone and Telegraph Company surrendered control of the Western Union Telegraph Company and also agreed to furnish connections to independent telephone companies; twenty-nine officials of the National Cash Register Company were convicted of unfair business methods involving the suppression of competition; and the New York, New Haven & Hartford Railway agreed to dispose of its steamship lines, its electric lines, and also of the Boston & Maine Railroad, thus practically ending its monoply of the transportation business in New England.

The noteworthy feature of trust regulation in the United States is that the courts have almost uniformly regarded combinations as illegal. It might almost be said that the burden of proof has rested on the combination to prove that it is not a trust. The Sherman Law gave the courts ample powers to deal with combinations, but interpretation of the law has varied. That trusts were generally illegal because of their very nature became an accepted theory, but just what constituted a trust was not clear. In the Harvester Trust case, for example, it was argued that the proportion of business controlled is no proof of violation of the Sherman Law. The company argued that it had lowered prices, raised wages, increased production and built better machines. It had not been overcapitalized, and was not making excessive profits. The court, however, declared that these features, while true, did not destroy the illegality of the corporation. W.F.Z.

Consult Ripley's *Trusts, Pools and Corporations;* Crowell's *Trusts and Competition;* Durand's *The Trust Problem.*

**TRUSTEE,** *trus te',* a person to whom the management of property has been legally committed. A trust may be created by will, by deed or by oral statement, but trusts affecting real estate must be in writing. One named as trustee may decline to accept, but once having undertaken a trust he cannot release himself unless the deed contains a provision enabling him to do so, or a competent court grants such discharge, or permission is given by all persons interested. A trustee must keep account of all moneys, collect debts, keep funds properly invested, and render an account at stated times to the beneficiaries or those for whom he is acting. He also is liable for consequences arising from violation of orders of the court, or wrongful uses of trust funds; misappropriation of funds is punishable as one of the statutory forms of embezzlement. Trust companies and banks, as well as individuals, may act as trustees of estates.

**TSCHAIKOVSKY,** *chi kawf'ske,* PETER ILICH (1840-1893), a composer, was born at Votkinsk, Russia. He was educated in Saint Petersburg (now Petrograd), and afterwards employed in

the Russian department of justice. But his love for music caused him to enter the Conservatory of Saint Petersburg, where he studied from his twenty-first to his twenty-fifth year. In 1866 he was appointed director of the Moscow Conservatory. There his first attempts at composing were almost complete failures, but in 1874 his beautiful *Quartette in F* gained public favor. Various other compositions were given a hearing in Russia, but the first genuine success for Tschaikovsky was in Boston, where his *Concerto in B Flat Minor* was played by Bülow in 1880. About the same time his opera, *Eugene Onegin,* was presented at the Moscow Conservatory and proved successful.

Life might have been very pleasant for him from that time, but an unfortunate marriage in 1877 soon began to pervert his whole nature, and by 1880 he was becoming a morose and bitter man. In 1879 he had attempted to commit suicide by standing up to his neck in an icy river, but the tender nursing of his brother saved him. For some time afterwards he was in Saint Petersburg and Paris. In 1881 his close friend, Rubinstein, died, and Tschaikovsky, in deeper despair than ever, dedicated his *Trio in A Minor* to the dead musician. He kept away from the public as much as possible, and lived in seclusion at Klin, Russia, where much of his best work was produced. In 1893 appeared his masterpiece, *The Sixth Symphony,* now known as the *Pathetic,* and the composer came forth temporarily from his seclusion to receive the degree of Doctor of Music from Cambridge University. He died of cholera in Saint Petersburg. Among his best works are the six symphonies and the operas *Maid of Orleans, Mazeppa* and *Charodaika.*

**TSET'SE FLY,** a biting fly related to the stable fly, found in Africa. It lives on the blood of mammals, and is a deadly pest because it carries a parasitic organism that causes sleeping sickness (which see). This disease has caused the death of thousands of natives in Uganda, the basin of the Victoria Nyanza, and other sections in equatorial Africa. The bite of the insect is sometimes fatal to cattle and horses, producing a disease called *nagana,* but animals which recover are usually immune from further attacks.

TSETSE FLY

Tsetse flies do not lay eggs, but multiply by producing full-grown larvae, which change immediately into pupa.

The problem of exterminating these pests has engaged the attention of many scientists. It has been suggested that they could be wiped out by wholesale slaughter of wild animal life in the infested districts, since they feed chiefly on the blood of mammals, but this plan has not been deemed practicable. Clearing out swamps and marshes where they breed has been attempted on a small scale, but effective work on this line would be a gigantic task. In a certain section of Portuguese West Africa the laborers carry cloths covered with glue on their backs when working in infested districts, turning themselves into animated pieces of fly paper. This plan is reported to have greatly diminished the number of cases of sleeping sickness in that region.

**TUBERCULOSIS,** *tu bur ku lo' sis,* or **CONSUMP'TION,** an infectious disease, sometimes called the *white plague* because of its prevalence and virulence. It causes about one-seventh of the deaths in the human family. The disease occurs in several forms, but the one in which the lungs are affected is the most common. No age, race or sex is immune from tuberculosis attacks, and its ravages are so serious that in several countries associations for the study and prevention of the disease have been formed. In the United States alone more than $22,000,000 was spent in the campaign against tuberculosis in the year 1915. In that year there were 98,194 victims, of whom 85,993 died of lung, or pulmonary, tuberculosis. These figures, however, represent a marked decrease from those of a decade previous. The specific organism which causes the disease, the *bacillus tuberculosis,* was isolated by Dr. Robert Koch in 1882.

**Lung Tuberculosis.** The most important source of infection is the dried sputum of tubercular victims. Carried about in the air by dust, the germs are taken into the nose and air tubes and thence into the lungs in the act of breathing. Milk and meat of tubercular cattle are other agents causing the spread of the disease. Except in rare cases, it is not directly transmissible from parent to child, but children whose parents are tubercular are more liable to the disease than are others. Certain habits and living conditions which lower the vitality and make the body less resistant to disease may cause a predisposition to tuberculosis. Impure air, lack of nourishing food, overcrowded living

and sleeping rooms, excessive indulgence in liquor, and other forms of dissipation, overwork and worry are some of these weakening habits and conditions.

*Symptoms.* Two general types of consumption have been noted; these are called *quick,* or *galloping,* and *chronic.* The latter is by far the more prevalent. The first symptoms of quick consumption are fever, pain in the side, labored breathing and lung congestion, and these gradually increase in severity until the patient dies. There is no cure. The other form begins with a dry cough, slight rise of temperature toward evening, declining appetite and a feeling of lassitude. If the disease is not checked the cough becomes chronic and very annoying, and a yellowish or whitish sputum is raised. This is sometimes colored with blood. Other symptoms are night sweating, pain in the lungs, constant fever, which is especially high late in the day, and emaciation. Sometimes quantities of blood are raised from the lungs during a spell of coughing. Death may occur unexpectedly from hemorrhage or exhaustion.

*Treatment and Prevention.* Though no specific has as yet been discovered for the cure of tuberculosis of the lungs, much can be done through treatment along hygienic lines. Many cures have been effected by removal of the

A TENT COLONY

Air and sunshine are depended upon to cure tuberculosis in this Adirondack Mountains colony.

patient to a dry, bracing climate, where the temperature is even and sunny days are numerous. Much emphasis is placed by modern authorities on the value of sleeping and living in the open and of eating nourishing food. The ideal place for a tubercular victim is a sanatorium in a healthful locality.

In regard to prevention it may be said that each person who lives hygienically and takes good care of his health is building up a resisting power that will greatly lessen his liability to this disease. City authorities are aiding in the preventive work by passing laws against spitting and by making other sanitary regulations. In Victoria, Australia, tuberculosis has been controlled by a system of reporting and registering suspected cases. Ample provision is made for taking care of victims too poor to pay for nursing and medical attention, and inspectors see to it that every one conforms to rules of hygiene and sanitation. A similar plan was inaugurated in 1917 in Framingham, Mass., under the auspices of the National Tuberculosis Society.

Consult Vallow's *The Care and After Care of Consumption;* Sylvan's *Consumption and Its Cure by Physical Exercises;* Ransome's *Campaign against Tuberculosis.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

Education, subtitle — Health Habits
*Hygiene of Education* — Life Extension

**TUBEROSE,** *tube'rohz,* a garden or hothouse plant of the amaryllis family, which has been described as "a lump of cloying sweetness." It is not related to the rose, the name being a corruption of the adjective *tuberous.* At one time the flower was extremely fashionable, but because of its heavy, almost sickening odor, it is now less frequently used. The slender stem, often three feet in height, springs from a tuberous rootstock and bears clusters of funnel-shaped, waxen-white blossoms at the top, and at the base, six or eight sword-shaped leaves. A native of tropical America and Asia, the flower is now cultivated extensively in France, Italy and Switzerland, and in North Carolina and New Jersey, for perfumes and toilet preparations. In the factories at Grasse, France, 80,000 pounds of tuberoses are used annually for this purpose. See PERFUME.

THE TUBEROSE

**TUCSON,** *too sahn',* ARIZ., the largest city of the state and the county seat of Pima County, is located seventy-six miles north of Nogales, which is on the international boundary line between the United States and Mexico, and 135 miles southeast of Phoenix. Transportation is provided by the Southern Pacific and by the El Paso & Southwestern railroads. The city

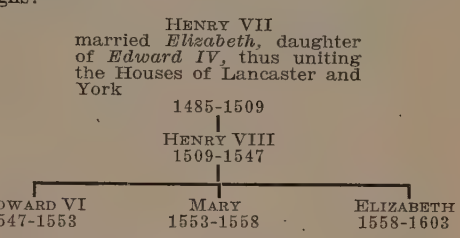
covers an area of about four square miles. It is situated along the Santa Cruz River, in a broad valley entirely surrounded by mountains. Its high altitude, 2,360 feet above sea level, and its healthful, dry climate have made the city a famous resort for tubercular patients. The resident population was 13,193 in 1910, and 16,750 in 1916 (Federal estimate).

Tucson is the seat of the University of Arizona and of the Desert Botanical Laboratory of the Carnegie Institution. Other educational institutions are Saint Joseph's Academy, a Carnegie Library and the United States Magnetic Observatory. Among several fine buildings are the Masonic Temple, erected at a cost of $100,000, and the El Paso & Southwestern Depot, which, with surrounding gardens, cost $350,000. Other features of interest are parks, the country club, Arizona Hospital and the Tucson-Arizona and Saint Mary's sanitariums. Tucson is situated in the heart of a rich copper country, and has extensive mining interests. It is in one of the oldest agricultural and stock-raising sections of the state, and ships annually about $2,000,000 worth of cattle. Railroad shops, iron works, a tannery and harness and saddle factories are included among the industrial establishments.

Tucson occupies the site of an Indian village, or rancheria, deserted about 1763. The first permanent settlement was a presidio, or Spanish fort, built in 1776. At that time the territory was under Spanish control, but eventually it came into the possession of the United States by the Gadsden Purchase of 1853. Tucson was the capital of the territory of Arizona from 1867 to 1877. It was incorporated as a city in 1877, and reincorporated in 1883. Historical interest centers in old San Xavier Mission. M.W.

**TUCUMÁN,** *too koo mahn',* a city in Argentine Republic, capital of the province of the same name. It lies on a plateau near the base of a range of the Andes, and is 300 miles northwest of Cordoba and 690 miles northwest of Buenos Aires. In Tucumán, on July 9, 1816, was signed the declaration of independence from Spain. The city is substantially built and has regular streets and attractive dwellings. Among the principal features are a modern cathedral and a national university, founded in 1912. The city is the center of a sugar-plantation district and is steadily growing in commercial importance. There are several local manufactories. Population in 1915, estimated, 66,000.

**TU'DOR,** the family name of an English royal house, whose reign, extending from 1485 to 1603, was a period of almost absolute royal authority. Most of the feudal nobility had been destroyed during the Wars of the Roses, but after the union of the two opposing royal houses by the marriage of Henry VII to Elizabeth, the daughter of Edward IV, the great body of the people were glad to have peace at whatever sacrifice. Thus the king ruled with an iron hand, forcing all factions to obey a common central law, and a greater national unity was established than had existed for many years, continuing down through Elizabeth's reign. On the death of Elizabeth the succession passed to James VI of Scotland, first of the House of Stuart. The following table gives the dates of the reign of each of the Tudor sovereigns:




Consult Innes's *England under the Tudors.*

**Related Subjects.** For the history of England during the reign of the Tudor kings the reader may consult the following articles in these volumes:

| | |
|---|---|
| Edward, subhead *Edward VI* | Elizabeth |
| England, subhead *The Religious Struggle* | Henry, subhead *Henry VII* |
| | Mary, subhead *Mary I* |

**TUDOR STYLE,** that style of English architecture which prevailed during the period of the Tudors, between 1485 and 1603. It was a late phase of the so-called Perpendicular style, a form of Gothic which was characterized by straight lines. During the reign of Henry VIII the mansions of the gentry and nobility were built on a quadrangular plan, with an inner- and a base-court and a gatehouse between them. Turrets, decorative chimneys and bay and oriel windows were popular. Late in the period the Elizabethan phase of the Tudor style developed; some of the country homes built at this time may still be seen in England. Characteristics of the Elizabethan style are great square windows, numerous fireplaces and chimneys, carved wooden staircases, gables, eight-sided turrets, projecting bay windows, paneled ceilings and great detail in ornamental work.

**TUESDAY,** *tuze'da,* the name of the third day of the week, is derived from *Tyr,* or *Tiu,* name of the Norse god of war. He was the

son of Odin, or Woden, to whom the day of Wednesday was sacred. The French name for Tuesday is *Mardi,* derived from *Mars,* the Roman war god. In the Church calendar *Shrove Tuesday* is the Tuesday before Lent. It is so called because confessions are made especially on that day and *shrift* is received.

**TUFA,** *too'fa,* a porous rock formed by the waters of mineral springs. These waters hold carbonate of lime or silica in solution and deposit these substances on evaporation. *Calcareous tufa* is formed from water containing carbonate of lime, and *silicious tufa* from that containing silica. Tufa is a coarse rock, and often contains twigs, leaves or mosses, around which it has formed. The name is also applied to an ash thrown out by volcanoes.

**TUFTS COLLEGE,** located at Medford, Mass., was founded in 1852 as a school for men. It was named for the donor of the site, Charles Tufts. At the present time the college occupies a campus of eighty acres, and the organization comprises the Jackson College for Women, the Bromfield-Pearson School, the Crane Theological School, the graduate school and the schools of liberal arts and of engineering, at Medford; and medical and dental colleges at Boston. The Bromfield-Pearson School prepares students who desire to enter the engineering department. Barnum Museum of Natural History, the gift of Phineas T. Barnum, is a conspicuous building on the campus. Andrew Carnegie donated the Eaton Library, which has 64,000 pamphlets and 73,000 volumes. Tufts College has a student enrolment of over 1,700 and a faculty of about 255.

**TUILERIES,** *tweel're,* or *twe'ler iz,* a famous royal palace, which stood on the right bank of the Seine, in Paris. It was named from the tile works that had formerly occupied the site. Catharine de' Medici began the building, which was originally a great circular structure surmounted by a dome. Later rulers of France made alterations in the plan, changing the central pavilion to a square, and adding north and south wings and a gallery which connected the palace with the Louvre. Few events of historic importance took place in the Tuileries before 1789, when Louis XVI and his family were forced by the revolutionary mob to take up their residence there instead of at Versailles. It was here the Swiss Guards were slain four years later, and here the Convention for a time held its sessions. It was the home of Napoleon, and continued to be the royal residence after the Restoration. In 1871 it was almost entirely destroyed by the communists. The garden of the Tuileries is still a favorite pleasure resort.

**TULANE,** *tu layn',* **UNIVERSITY,** located in New Orleans, is one of the largest and strongest institutions of higher education in the South. The organization evolved from the Medical College of Louisiana, one of the first medical schools of the country, established in 1834. Out of the medical school developed the University of Louisiana, chartered in 1845. The Tulane University dates from 1882, when Paul Tulane, a merchant of New Orleans, donated the first instalment of a $1,050,000 gift for an educational institution in the city. It was decided by the administrators that the income from the fund should be used to strengthen the existing university.

In 1884 the present name was adopted, and a contract was made between the state and the administrators whereby the Tulane Fund would be forever exempt from taxation. Later a gift of $100,000 from Mrs. Josephine L. Newcomb, increased by her will to $3,000,000, established the H. Sophie Newcomb Memorial College for women. The other departments of the university are the colleges of arts and sciences, commerce and business administration, technology, medicine, law, dentistry and pharmacy. Especially valuable work is done in the departments of hygiene and tropical medicine, and in sugar chemistry and sugar engineering. All departments are located in New Orleans. The faculty numbers about 310, and the student enrolment is over 2,700. The library contains about 71,000 volumes.

**TU'LIP,** a genus of early-blooming plants belonging to the lily family, widely cultivated for their showy flowers of many colors. The tulip is one of the most gracefully-fashioned of garden favorites, a characteristic which led the poet James Montgomery to write:

> Not one of Flora's brilliant race
> A form more perfect can display;
> Art could not feign more simple grace
> Nor Nature take a line away.

There are about forty-five species, most of which are native to Southern Europe and to the warm regions of Asia. Nearly all cultivated varieties of tulip are derived from a species brought to Vienna from Constantinople in the sixteenth century. The very name is of Turkish origin, and means *turban.* Tulips grow from bulbs. The leaves spring directly from the bulb, and the flower stems, which are from three inches to over two feet in height,

end usually in a single large, bell-shaped flower, though sometimes there are two, three or four in a cluster. The flowers are single or double, and usually grow erect on the stem. There are four principal groups of cultivated tulips: these are *selfs,* having flowers of one color; *roses,* with flowers of different shades of scarlet, pink and red; *bizarres,* the petals of which have yellow centers with borders of orange or red; and *bybloemens,* with black, brown, purple and other dark-colored flowers.

THE TULIP

Tulips are usually cultivated from bulbs. These are planted in midautumn, and the flowers and leaves appear in early spring. The plants require a well-drained, loamy soil of average richness. As a general rule only professional growers or experimenters grow tulips from seed, as it takes from three to seven years to obtain a flowering bulb, and after a few seasons the blossoms tend to change materially in color.

After the introduction of the tulip into Europe it became the flower of fashion both in England and in Holland. In the latter country, between 1634 and 1637, interest in the new plant developed into a craze. Individual bulbs sold for fabulous prices; many persons were financially ruined by wild speculation, and the government was compelled to intervene. M.W.

**TULIP TREE,** a beautiful tree of the magnolia family, so called because its flowers resemble the tulip. It is found only in the United States, and is distributed through the eastern part of the country south to Florida and west to Arkansas and Illinois. The tulip tree attains a height of eighty to 200 feet, and a diameter of five to ten feet, and is loved for its shade and its beauty. It bears showy, yellow flowers, each petal marked with a spot of orange to attract the bees; and it has smooth, dark-green leaves that turn yellow in the autumn. The wood, which is easily worked, is used in making boats, shingles, brooms and wood pulp, and interior finish for houses. *Poplar, tulipwood* and *whitewood* are various names applied to the timber. From the bark, which has a bitter taste, a drug tonic is prepared.

THE TULIP TREE
Form of the tree, leaf and flower.

**TUL'SA,** Okla., the county seat of Tulsa County, is situated in the northeastern part of the state, on the Arkansas River, fifty-two miles northwest of Muskogee and 120 miles northeast of Oklahoma City, the state capital. It is served by the Missouri, Kansas & Texas, the Atchison, Topeka & Santa Fe, the Midland Valley, the Saint Louis & San Francisco and the Tulsa & Sand Springs railroads. The place was settled in 1887, was chartered as a city in 1902, and in 1909 it adopted the commission form of government. Since 1900 the population has shown a remarkable increase. In that year it was 1,390; in 1910 it was 18,182, and in 1916 it was 30,575 (Federal estimate).

Tulsa is located in a region well adapted to stock raising and agriculture, especially to the growing of cotton and grain, but its prosperity is chiefly the result of its proximity to natural gas, coal and oil fields; the Glen Pool oil district is one of the richest in the world. Some of the large oil companies have headquarters here. Natural gas is largely used in manufacture, which is here represented by cottonseed-oil mills, glass factories and plants for making oil-well supplies. The place also has smelters and refineries. Tulsa has a $175,000 Y. M. C. A. building, a $200,000 Federal building, a Carnegie Library and Kendall College (Presbyterian). W.A.R.

**TUMBLEWEED,** *tum'b'l weed,* the popular name of various plants found in prairie regions. They are so called because they develop rounded tops, and in the autumn, when with-

ered, are carried or *tumbled* about by the wind, like great, light balls. As they scatter their seeds about in their travels over the plains, they are considered a pest by farmers and ranchmen. Among the common American tumbleweeds are the so-called *Russian thistle* and two species of pigweed.

**TUMOR,** *tu'mer,* a word meaning *swelling.* As commonly used it is applied to a growth in the body which may be composed either of tissues like those in which it is formed, or of unlike tissues. The former kind of tumor is called *benign,* or *innocent,* and the latter, *malignant.* Innocent tumors are usually not a source of pain or discomfort, though they are sometimes an inconvenience. They are removed without danger, and do not return. Malignant tumors are painful, and are a source of ill health. When removed they are liable to return, and their tendency is to eat into surrounding parts and to terminate fatally. See CANCER. C.B.B.

**TUN'DRA,** the Russian name for the extensive, low-lying, swampy plains of Siberia, Europe and North America, bordering on the Arctic Ocean. The surface is covered with a dense growth of peat moss, which increases so rapidly during the summer months, when the marsh thaws for a depth of two feet, that each fall the ground has risen several inches in height. During the short summer season wild birds and fur-covered animals may be seen, while flowering plants flourish in some parts. The tundra cannot be crossed except in the winter season, when the surface is hard.

**TUNG'STEN,** a rare metallic element of a grayish-white color, related to chromium (which see). It is used to harden steel, in order to make it a more suitable material for tools, and drawn tungsten wire has an important place in the manufacture of filaments for incandescent lamps. *Partinium,* the alloy of tungsten and aluminum, is employed in automobile manufacture. The metal does not occur in a native state, but is found in the rare minerals wolfram, scheelite, stolzite and a few others. Its atomic weight is 183.6; its symbol is W; and its specific gravity, 16.6.

**TUNIC,** *tu'nik,* from the Latin *tunica,* a word having several applications, but most closely associated with the dress of the ancient Romans. The Latin tunic was an undergarment worn by both men and women, and was fastened about the waist by a belt or girdle. It was covered by the toga, when worn by men, and by the stola, when worn by women. The tunic of the Romans corresponded to the chiton of the Greeks. Roman senators wore a tunic having two broad stripes of purple down the center (*latus clavus*), while the tunic of the knights had two narrow stripes (*angustus clavus*). Generals celebrating a triumph and magistrates presiding at the games were dressed in the purple toga and a gold-embroidered tunic (*tunica palmata*).

Tunic, or *tunicle,* is also the name applied to a vestment worn in the Roman Catholic and in some Anglican churches by the subdeacon who

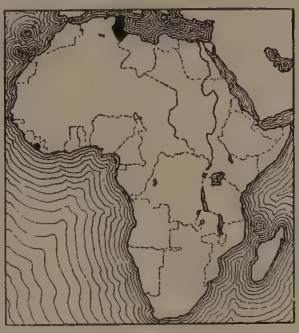
THE TUNIC

(*a*) The Doric tunic; (*b*) the Etruscan; (*c*) the Phrygian.

officiates at the celebration of the Mass. The term is used somewhat locally to designate the fatigue coat of a private in the British army. At the present time, any loose, short garment, fastened at the waist by a belt or girdle and reaching from the neck to some distance above the knee, is called a tunic. The term is heard frequently in connection with the modern gowns of women, and may refer to a sort of overskirt of varying length. B.M.W.

**TUNING FORK,** the invention of John Shore, sergeant trumpeter to George I of England, is a steel instrument having two prongs which, when set in vibration, give forth a musical sound varying in pitch according to the thickness of the steel, the length of the prongs, or their distance apart. The ordinary tuning fork sounds only one note, usually middle C or the A below it, but some are made with a slide on each prong, which, when moved up or down, regulates the pitch of the note produced. The latter are of German construction.

**TU'NIS,** a French protectorate on the Mediterranean coast of Africa, occupying the most northerly portion of the continent. It was one of the old Barbary States, and has been under the protection of France since 1883. Tunis is bounded on the north and east by the Mediterranean, on the west by Constantine, a department of Algeria, and on the south by Tripoli and the Sahara Desert. It has an area of about 48,000 square miles, about that of the state of Louisiana, and its population is estimated to be 1,780,527, slightly less than that of the American state. The majority of the inhabitants are Bedouin Arabs and Jews, but French, Italians, Anglo-Maltese, Spaniards, Greeks and Turks are found in considerable numbers.



LOCATION MAP

This little country, bordering the Mediterranean Sea, is a very small part of the great continent of Africa.

The northern half of the country is a plateau, enclosed on the north and south by the Little Atlas and the Great Atlas mountains, and the southern half is a continuation of the Sahara. The plateau region in the northern part contains the principal river, the Mejerda, as well as many smaller streams, and is the chief agricultural district; the southern part is a treeless plain covered with esparto grass. In the upper part of the Sahara region the date palm flourishes, for the land is irrigated by water from many hot springs. All of the remaining desert region is a barren waste.

The fertile area of Tunis has been well developed by European colonists, many of whom own or have leased large estates. About 1,125,000 acres are devoted to wheat, and nearly as many to barley, and there is also a profitable yield of oats. Over 6,000,000 gallons of olive oil are produced each year from the fruit of nearly 12,000,000 trees, and in the desert region there are over 2,000,000 date palms. Other products include almonds, oranges, lemons, henna and cork.

Stock raising and mining are other industries of considerable importance. The production of phosphates is increasing every year, and lead, zinc and iron are also mined in profitable quantities. The natives engage in fishing, spinning and weaving wool, carpet weaving and saddle making, and in the manufacture of matting, slippers and pottery. The country has over 1,400 miles of railway and about 2,000 miles of good carriage roads. In normal years there is a thriving import and export trade, chiefly with France. Tunis, a city of about 164,600 inhabitants, is the seat of government. It lies about three miles from ancient Carthage. J.S.C.

Consult Wartegg's *Tunis: The Land and the People.*

**Related Subjects.** The reader who is interested in this discussion of Tunis may consult the following articles in these volumes:

| | |
|---|---|
| Barbary States | Date and the Date Palm |
| Bedouins | Sahara |
| Carthage | |

**TUNNEL,** *tun'el,* an underground passage, piercing mountains or hills or passing under the beds of rivers. Engineers once avoided the construction of tunnels because of the expense, but of late years many difficult engineering feats have been undertaken in order to straighten railway rights of way and to lessen running time. Tunnels are considered by engineers as of two kinds—those driven through rock and those excavated in soft earth. Rock offers a tough resistance to tunneling, but it has the advantage of requiring usually no support. The rock is drilled to form pockets, in which are placed charges of high explosive, which is then discharged by means of an electric spark. The shattered fragments of stone are removed as the work progresses. Four of the greatest tunnels in the world, the Alpine tunnels of Mont Cenis, Saint Gotthard, Arlberg and Simplon, were blasted out of solid rock. When a tunnel is driven through soft earth or under the mud of a river bed, it is necessary to support the soil above to prevent caving. This is accomplished by supporting the roof of earth with a sheath of timbers or steel, about which cement is poured and allowed to harden.

In the construction of submarine tunnels the most serious difficulty to be overcome is the inflow of water. Only in cases where the tunnel lies far beneath the bed of the stream is this not a serious problem for the engineer. The situation is met by the use of the compressed-air or the shield system; sometimes the two are used in combination. By the compressed-air method the pressure of the inflowing water is checked by compressed air in the end of the tunnel where the work is going on. The other system takes its name from the ingenious me-

chanical device used in the operations. The tunnel shield is a cylinder of steel plate with the front fashioned to form a sharp edge. Hydraulic jacks are attached to the inside surface of the cylinder. Their piston rods, as power is applied, press against the lining of the tunnel already completed, and push the cutting edge of the cylinder into the earth to be excavated.

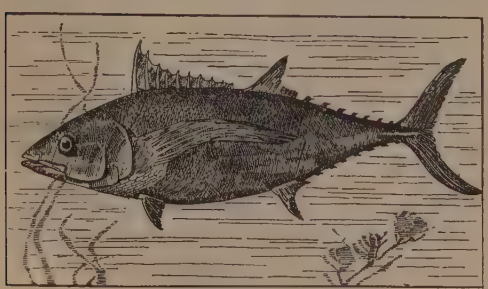
Near the front of the cylinder is a partition with openings, which the operators may close at will. As the cylinder is forced ahead the earth is withdrawn in small amounts through the openings. At the rear end new lining for the tunnel is constructed with each forward movement of the front edge. In another method of river tunneling several cylindrical steel sections are first made and sunk in position in the river bed. These are then fastened together, and enclosed and lined with concrete. The subway tunnels laid under the Harlem River for the New York subway were constructed in this manner.

Consult Brunton and Davis's *Modern Tunneling;* Stauffer's *Modern Tunnel Practice.*

**Related Subjects.** In the following articles the reader will find descriptions of various important tunnels:

| | |
|---|---|
| Cenis | New York, subhead *Tunnels* |
| Hoosac Tunnel | Saint Gotthard |
| Hudson River Tunnels | Simplon |

**TUNNY,** *tun'i,* or **TUNA,** *tu'na,* the largest fish of the mackerel family, found in all warm ocean waters. The name *tuna* is the one more commonly heard in America, where the fish is rapidly increasing in favor. The fisheries off



THE TUNNY, OR TUNA

the California coast are the most important, especially those along Catalina Island. Because of the large size and the fighting spirit of the fish, tuna fishing is regarded as rare sport by anglers who enjoy a stiff fight. These fish may reach a length of ten feet and a weight of 1,500 pounds, but such giant specimens are rare. The body is shaped much like that of the ordinary mackerel, but is thicker; the tail is so widely forked as to approach the form of a crescent. In Europe the most important fisheries are in the Mediterranean Sea, where the fish are captured in nets. The flesh is sold fresh and in cans; in Italy different parts of the fish are packed separately and marketed under special names. The flesh tastes somewhat like chicken, and canned tuna makes a delicious salad.

**TUPPER,** *tup'er,* the family name of two Canadian statesmen, father and son, both of whom were prominent in the Conservative party in the latter part of the nineteenth century.

**Sir Charles Tupper** (1821-1915) was one of the foremost Canadian statesmen. He was responsible for the adherence of Nova Scotia to the Confederation, later a member of Sir John Macdonald's Cabinet, then Canadian High Commissioner to Great Britain, and finally Premier of Canada. During the closing years of his life, Tupper shared with Lord Strathcona the distinction of being the "Grand Old Man of Canada." He was a man of medium height, wiry and straight, with intense nervous energy, which made him mentally and physically active almost to the day of his death. Tupper was seventy-five years old when he became Premier of Canada.

SIR CHARLES TUPPER

Tupper was born at Amherst, N. S. His Puritan ancestor, Thomas Tupper, left England for America in 1635, and settled in Connecticut. The great-grandfather of Sir Charles migrated in 1763 to Nova Scotia, where he took land vacated by the deported Acadians. There his famous descendant was born. Sir Charles was educated at Horton Academy, Wolfville, and in 1843 was graduated in medicine from the University of Edinburgh. Returning to Nova Scotia, he began practice at Amherst, and in a brief period, through his proficiency and energy attracted general attention. For twelve years Dr. Tupper was a general practitioner, braving all the hardships which that position entailed.

In 1855 Dr. Tupper, yielding to the solicitation of his friends, entered politics as a

Conservative candidate for the Nova Scotia assembly. His opponent was Joseph Howe, the brilliant leader of the Liberals. The election resulted in a sweeping victory for the Liberals, except that Howe went down to defeat before Tupper. Tupper's sensational victory made him second only to Johnstone, the Conservative leader, in influence, and in 1864 Tupper succeeded him as premier of Nova Scotia. During the next three years Dr. Tupper was most active in promoting Confederation, and it was due to his efforts that Nova Scotia, in spite of Howe's great influence, joined the union. After Confederation was accomplished Howe went to London to secure its repeal, but Tupper, as the representative of the new Dominion, followed him there, and not only persuaded the British government that repeal was unwise but also persuaded Howe, who entered the Dominion Ministry six months later.

Dr. Tupper had refused a seat in the Cabinet in 1867, but he gave service in the House of Commons and was recognized as one of Sir John Macdonald's closest advisers. In 1870 he resigned as premier of Nova Scotia and entered the Dominion Ministry as President of the Council, but in 1872 became Minister of Internal Revenue and in 1873 Minister of Customs. Five years later, when the second Macdonald Ministry was formed, Dr. Tupper, as he was still generally called (although he was knighted in 1878), became Minister of Public Works. The next year, at his suggestion, the Department of Railways and Canals was created, and he was its first Minister. As such he directed the enlargement of the Welland Canal and improvements in the Intercolonial Railway and the Saint Lawrence River channel, and was a leader in the negotiations which led to the construction of the Canadian Pacific Railway.

In 1883 Sir Charles went to London as Canadian High Commissioner, at the time retaining (until 1884) his position in the Dominion Cabinet. In 1887 he was called back to Ottawa by a crisis in the affairs of the Canadian Pacific Railway, and for a year, as Minister of Finance, labored to place its finances on an easier basis. He then returned to London as High Commissioner, and in the same year (1888) was created a baronet. He remained in London until 1895, when he was called again to Ottawa, to assume the leadership of the Conservative party as successor to Sir Mackenzie Bowell. Sir Charles became Premier in April, 1896, but the Conservative party was so weakened by internal quarrels and defections of prominent members that it was defeated in the general elections in June. Sir Charles thereupon remained until 1900 as leader of the opposition.

Consult Saunders' *Three Premiers of Nova Scotia;* Sir Charles Tupper's *Recollections of Sixty Years.*

**Sir Charles Hibbert Tupper** (1855- ), the son of Sir Charles Tupper, was born at Amherst, N. S., and was educated at McGill University and at the Harvard Law School. His entrance into public life was accidental. In the early stages of the political campaign of 1882 there was a factional fight among the Conservatives in Pictou, N. S. While the deadlock was in progress both sides consulted young Tupper to see if he, presumably through the influence of his father, could effect a friendly settlement. Neither of the two candidates for the House of Commons would retire in favor of the other, but both accepted Tupper as a compromise candidate. Tupper was elected, and thereafter served in the Commons until 1904. From 1888 to 1895 he was Minister of Marine and Fisheries, and in 1895-1896 was Minister of Justice and Attorney-General.

In 1893 Tupper was British agent before the tribunal which arbitrated the Bering Sea Controversy. For his services he was knighted by Queen Victoria. In 1895, when his father became Premier, Sir Mackenzie Bowell suggested that the younger Tupper succeed his father as Canadian High Commissioner at London, but the father decided to appoint Lord Strathcona and kept his son in the Ministry as Minister of Justice. Sir Charles Hibbert, after 1897, practiced law at Vancouver, and in 1904 retired from public life. It was he who suggested Robert Laird Borden as leader of the Conservative party. W.F.Z.

**TUR'BAN,** the name of a headdress, having special reference to that worn by men in Mohammedan countries. This name is of the same origin as the word *tulip,* both being derived from the Turkish *tulbend,* an adaptation of the Persian *dulband,* a scarf wound round the head. There are many variations in the style, size and color, but in general the turban is a scarf of silk, linen, cotton or other cloth, folded around the head, or about some sort of a cap. Turbans in Oriental countries show distinctions of rank, professions, social position, etc. In India priests usually wear white headdresses; the nobles, gaudy and ornamental ones. The turban of the Turkish sultan contains three heron's feathers, and is further adorned with precious stones. Two heron's feathers appear

in the turban of the grand vizier, and one in those of other officers.

During the first half of the nineteenth century women in Europe and America wore a modification of the Oriental turban, a custom

TURBANS

(*a*) Style worn by Christian priests in Northwestern Asia; (*b*) Morocco turban; (*c*) Syrian; (*d*) turban of citizen of Damascus.

alluded to in Mrs. Gaskell's classic of village life, *Cranford:*

> I was anxious to prevent her from disfiguring her small, gentle, mousey face with a great Saracen's-head turban.

The gaudy headdresses worn by negro women in the West Indies and the Southern United States are also known as turbans.

**TURBINE WHEEL,** or **TURBINE,** *tur'bin.* The lawn sprinkler, which rotates by the reaction of the air upon the water flowing through holes in its arms, is the simplest type of a turbine wheel. By enlarging the sprinkler and increasing the pressure of the water a motor might be obtained with sufficient power to run a sewing machine or a coffee grinder, but the waste of water would be so great as to render the motor impracticable. A simple type of turbine wheel, commonly known as a *water motor,* consists of a small wheel with cups on the outer ends of its spokes, and enclosed in an iron case. A jet of water under high pressure strikes against the cups and causes the wheel to rotate. These motors are from twelve to fourteen inches in diameter and are very successful for operating machines that require but little power. In principle they are reaction wheels.

The larger turbine used in mills consists of an iron wheel with curved blades, or flanges, on its surface, enclosed in an iron case to whose inner surface blades similar to those on the wheel, but curving in the opposite direction (see Fig. 1), are attached. These turbines may be placed in a vertical or a horizontal position as conditions require, but most of them are horizontal. The wheel is placed several feet lower than the surface of the water to be used as a source of power, and is connected with the water supply by an iron pipe called the *penstock* (see Fig. 2). When the water is let into the penstock it flows through a number of openings in the case against the blades on the wheel, which is made to revolve by the pressure of the water.

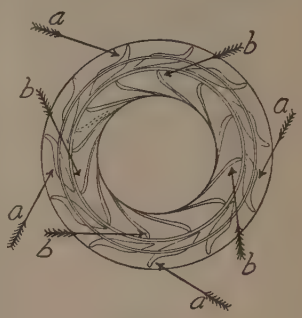



FIG. 1

(*a*) Blades on the inner surface of the case; (*b*) blades on the wheel.

Since the pressure of water is increased by its depth, a wheel fifty feet below its source of water supply will have twice the power of a

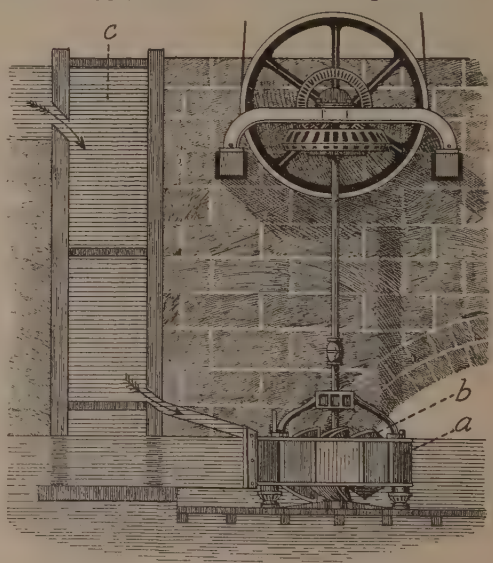



FIG. 2

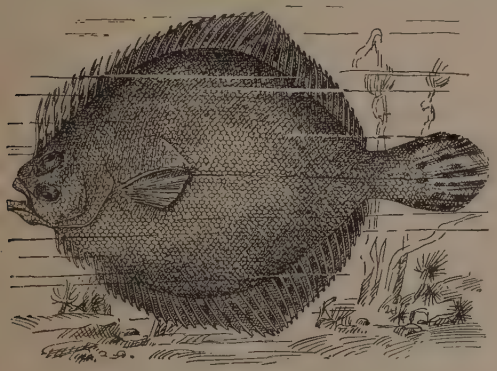
(*a*) Case; (*b*) wheel; (*c*) penstock.

similar wheel twenty-five feet below the water. Turbines of this type are known as *pressure* turbines, and they utilize ninety per cent or more of the power. Pressure turbines vary in size from a few inches to eighteen feet in di-

ameter. The largest turbines are at Niagara Falls and at Keokuk, Iowa. Some of these are directly attached to dynamos that generate an electric current equivalent to 7,500 horse power.

**Steam Turbine.** The steam turbine operates on the same principle as the water turbine, except that it makes use of both the direct pressure and the expansive power of steam. The most satisfactory type of steam turbine consists of a series of turbines, each succeeding one being a little larger than the one before it, to adapt the motor to the expansion of the steam. The blades on the wheel and those on the enclosing case curve in opposite directions, as in the water turbine. Steam turbines are used for propelling large steamships and for operating large dynamos. W.F.R.

**TUR'BOT,** one of the largest of the flatfishes, and one of the species that is of most value commercially. It is seldom longer than two feet, and weighs about eighteen pounds, although ninety-pound turbot have been caught.



However great the dish that holds the turbot, the turbot is still greater than the dish.
—MARTIAL: *Epigrams.*

It has a very flat, wide body, with a long fin on the top and bottom ridges. Its upper surface is brown and covered with hard, round knobs. The turbot is a sea fish, and its eggs—five or ten million to a fish—float on the ocean surface, but the full-grown turbot prefers a sea bank, where it lies on its lighter side. Both the eyes are on the upper side of the body. The turbot abounds off the western coast of Europe, where it is caught for export. See FLATFISH; FLOUNDER.

**TURGENIEFF,** *tur gen' yef,* IVAN SERGEYEVITCH (1818-1883), a Russian novelist, born at Orel. The family owned large estates and numerous serfs, and the boy was trained for the life of a cultured country gentleman. He was educated in the University of Moscow and under private instructors at Berlin, and knew German and French much better than his native tongue. It was the custom of the day for the aristocracy of Russia to scorn their own language, and Ivan's mother would not use it in her home circle. However, a Russian peasant aroused his admiration for the language and literature of his native land by reciting some early Russian poetry, and the young man began to write for native magazines and newspapers.

In 1852 he won praise for his *Papers of a Sportsman,* describing the sufferings of Russian peasants. This book undoubtedly hastened the emancipation of the serfs. *A Nest of Nobles* once more drew a vivid contrast between the aristocracy and the working classes of Russia, and this was soon followed by works of the same character, *Fathers and Children, Smoke* and *Virgin Soil.* Pessimism and realism are never absent from these stories, but their plots are so skilfully woven and their characters so strongly drawn that readers almost forget the tone of sorrow in the work. He has often been compared to George Eliot in the uncompromising view he took of life and also in the artistic quality of his style. His last years were spent near Paris. He was buried in Saint Petersburg (Petrograd), and his funeral procession was longer and more elaborate than any other which up to that time had been held in Russia.

It was Turgenieff who coined, in his *Fathers and Children,* the word *nihilist,* which has since figured so largely in all writings about Russia.

**TURGOT,** *toor go',* ANNE ROBERT JACQUES, BARON D'AULNE (1727-1781), a French statesman who did his best, though unsuccessfully, to remove some of the abuses which led to the French Revolution. He was educated for the priesthood, but found law and economics more interesting than ecclesiastical subjects; and after holding various minor offices he was called to the Ministry. As Comptroller-General he attempted to reduce expenditures and to apply the excess funds toward the reduction of the old public debt. He also tried to compel the nobles and the clergy to assume a share of the burden of taxation, which then rested entirely on the peasantry. This roused the enmity of these privileged classes, and Turgot was compelled to retire.

**TU'RIN,** the Italian city of TORINO (*toh re' no*), capital of the province of the same name. It lies in a beautiful plain surrounded by mountains, on the River Po near its junction with the Dora Riparia, eighty miles northwest of

Genoa and seventy-six miles southwest of Milan (see map, opposite page 2092). In summer Turin is one of the most attractive places in the north of Italy. On the left bank of the Po are the beautiful parks and botanical gardens, and there are many inviting walks along the stream. On a hill overlooking the city from the east rises the great church of La Superga, now the mausoleum of the House of Savoy. The summit of the hill, which is reached by a cable railway, affords a magnificent view of the city and its surroundings.

Turin is different from most Italian municipalities because of its regularity. The long, straight streets cross one another at right angles and bound rectangular residence blocks and handsome public squares. The principal avenues lead from the Piazza Castello, in the northeastern part of the city. North of this square is the royal palace, containing the royal armory; the royal park adjoins it, and near by are fine public gardens. The city has numerous statues and monuments; especially noteworthy are those erected in honor of Cavour, Duke Victor Amadeus I and King Charles Albert. The educational institutions include a university founded in 1405, a royal polytechnic school, military schools, an observatory, a national library with 350,000 volumes, and museums.

Turin is important industrially for the manufacture of steel and iron goods, textiles, ribbons, laces and velvets, porcelain and furniture, and it exports large quantities of wine and silk. It has developed as an important military station because of the proximity of the French boundary and the Alpine passes. The city dates from Roman times and has been prominent in Italian history. From 1861 to 1865 it was the capital of the kingdom of Italy. Population in 1915 (of city and suburbs), estimated, 451,994. Only Naples, Milan and Rome surpass it in size among Italian cities. R.D.M.

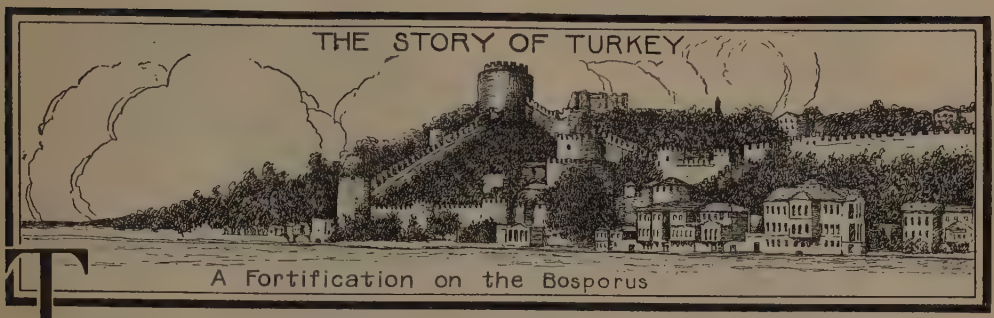
**TURKESTAN,** *tur keh stahn'*, a vast territory in Central Asia, stretching from Mongolia to the Caspian Sea, and from the northern steppes to Tibet and India. Politically it is divided into Russian, or Western, Turkestan, and Chinese, or Eastern, Turkestan.

**Russian Turkestan,** which has an area of about 420,807 square miles, includes the territories of Ferghana, Samarkand, Semiryetchensk and Syr-Darya. Its population was estimated in 1914 to be 6,350,300. The majority of the inhabitants, who are nearly all Mohammedans, live in the southern part of the country, where the waters of the various streams are used for irrigation, and good crops of wheat, rice, millet and oats are raised. Other products include rice, fruit and silk. No other branch of agriculture, however, is so important as the raising of stock, and the country supports immense herds of sheep and goats, horses, cattle, swine and camels. Of domestic products carpets and rugs are the most important. This region is a part of a Russian government which includes also a portion of the Pamir and the province of Transcaspia. The most important cities are Tashkend (the seat of government), Khokand, Namangan and Samarkand. Tashkend and Samarkand are on the Transcaspian Railway, and the former city is connected by rail with Orenburg, on the frontier of Russia. In October, 1917, a revolt, organized by political agitators, broke out in Turkestan. The provisional government of Russia immediately adopted measures to quell the rebellion. See TASHKEND; SAMARKAND.

LOCATION MAP
(*a*) Russian; (*b*) Chinese. The borders of Chinese Turkestan are somewhat indefinite.

**Chinese Turkestan,** a great region of indefinite boundaries, lying to the east and southeast of the Pamir and Russian Turkestan. The region as a whole, which covers an area of over 550,000 square miles, more than twice that of Texas, is a vast, barren plateau with mountain barriers on all sides. Along its northern boundary is the long chain known as the Tian-shan Mountains, and the Kuen-lun, Altyn Tag and other lofty ranges shut it in on the south. On the east it is penetrated by the desert of Gobi. The plateau is drained by the Tarim River and its tributaries, and along the base of the mountains there are lines of fertile oases, in which agriculture and stock raising are carried on. In the larger towns, silk, carpets, leather goods and copper ware are manufactured. Trade by means of caravans is carried on extensively between Eastern Turkestan and China. Politically the region is a part of the Chinese province of Sinkiang. The inhabitants, who are of mixed Turkish and Aryan descent, number about 2,000,000. J.S.C.

Consult Meakin's *In Russian Turkestan;* Church's *Chinese Turkestan with Caravan and Rifle.*




A Fortification on the Bosporus

**TURKEY,** *tur'ki,* a country which lies for the most part in Asia, south of the Black Sea and east of the Mediterranean, but of whose area 8,644 square miles were yet in Europe on January 1, 1918. Its Asiatic territory embraces 701,580 square miles, which gives the Turk 710,224 square miles of the earth as his possession. The population is about 21,300,000, of whom 1,900,000 are in Europe. Turkey was the most powerful factor in Europe in the early modern period, when its boundaries stretched much farther to the north; for reasons which are revealed below in the description of its lands, customs and politics it has sunk to the lowest level among the powers of Europe and Asia. It has been permitted to retain its little corner of progressive Europe only because there never have been European statesmen adroit enough to divide its territory among the powers and satisfy each interested country.

It cannot be said that Turkey is the land of the Turks, for there are vast stretches of it that contain few of that race. Turkey has been at various times European, Asiatic and African, but the Turk never has been and never will be other than Asiatic. Though its capital since 1453 has been on European soil, and was the center of a splendid civilization when they took it in that year, the captors through nearly 500 years never learned from their neighbors the fine art of living or fair methods of government. There was every opportunity for increased enlightenment, because from time to time the Turk by conquest possessed himself of the advanced centers of the Mediterranean world, but he invariably reduced these to his level of thought and action; an authority has declared that "grass never grows where the Turkish hoof has trod."

**The People.** More than ninety per cent of the subjects of the Turkish Empire are Mohammedans, and the country is the center of the Mohammedan religion. The *Koran,* the basis of the faith, is the foundation upon which the government, in all its functions, is built. The Mohammedan reviles the Christian, hence the Christian population has always found itself in a situation of dire distress. The follower of the Prophet who kills an infidel—any person of another faith—is sure of added rewards in the life beyond the grave.

There are three principal classes of Turkish subjects. The fortunate class embraces the officials, and of these there is a vast number. Their authority is derived from the sultan, who appoints and removes at will. Next there is the tradesman class, some of them wealthy and many in moderate circumstances, financially, but by far the greater number in a doubtful position and always at the mercy of the overlords. The peasant class numbers millions of souls, and possibly nowhere else in the world is the peasantry so much in need of a merciful government. It is as well for them to remain in poverty as to try to accumulate the means to better their lot, for officials keep a constant check upon them and with a show of legality take everything which is not necessary to sustain life. This story of an outraged people is further developed under the subtitle *Government,* below.

*Their Cities.* To any other people than the Turks the country would be a rich heritage. In some of its cities the moving events of the ancient and medieval world were enacted. Foremost is Constantinople, a truly royal city, now ragged and dirty, yet one of the most important on earth, the meeting place of the East and the West. On the Mediterranean shores the commerce of the world had its beginning, but the Phoenician cities have crumbled. It possesses Jerusalem, the holy city of the Christian world, the center of the activities of Christ; the Crusaders wasted thousands of lives in vain attempts to wrest it from the hands of the infidel. Halfway down the narrow western arm which borders the Red Sea, in Mecca, the prophet Mohammed was born; it is the sacred city to-

THE EMPIRE IN 1481

The black boundary lines show the limits of Turkey a few years after the capture of Constantinople (1453).

day of 250,000,000 devout, fanatical religionists. It has 80,000 permanent inhabitants and often holds a hundred thousand pilgrims. Just north of Mecca is Medina, another holy city, half as large as Mecca; in it was buried the founder of the Mohammedan faith.

Smyrna, 2,500 years old, is on the Aegean coast, a great, cosmopolitan city, largely Greek, and known best for the exportation of the Oriental rugs which bear its name and for the figs which comprise a good part of its commerce. Scutari, the lovely suburb of Constantinople, is the nearest Asiatic city to the mainland of Europe. Trebizond, the capital of the province of the same name, on the southern Black Sea shore, was taken by the Russians in 1916 in the War of the Nations. South of it, in suffering Armenia, is Erzerum, also taken by Russia. Aleppo, an ancient city, now a commercial center of 200,000 people; Damascus, with the glamour of Bible stories yet clinging to it, but to-day a bustling city of a quarter of a million thronging its "street called Straight;" Bagdad, a real yet almost a fabled city, center of ancient learning, famous as the scene of the *Arabian Nights Entertainment* and now of greater importance than ever before because of its railroad connecting Europe with the Persian Gulf—all of these are to-day cities of growing importance.

Throughout the country, in many places far from present homes of man, are majestic columns yet standing which speak of an old civilization in advance of anything Turkey knows to-day. The life of the world had its beginning here, if we are to credit the belief that the Garden of Eden was located in the Tigris-Euphrates region. The glories of the past furnish no inspiration to the Turk, however, for they are Christian monuments.

## *The Land and Its Resources*

The northern part of Turkey in Asia is the ancient Asia Minor, through whose mountain passes for many centuries caravans laden with Oriental riches reached the island-fringed coast. The modern name for the section is *Anatolia*, derived from Greek words which mean *to rise*, and having reference to the table-lands which rise to an average elevation of 3,000 feet. These reach nearly to the sea, but drop suddenly and form a narrow, fertile belt known as the *Levant*.

BOUNDARIES OF THE EMPIRE IN 1683

The map emphasizes the dismemberment of the Empire, with the dates at which the various provinces were lost.

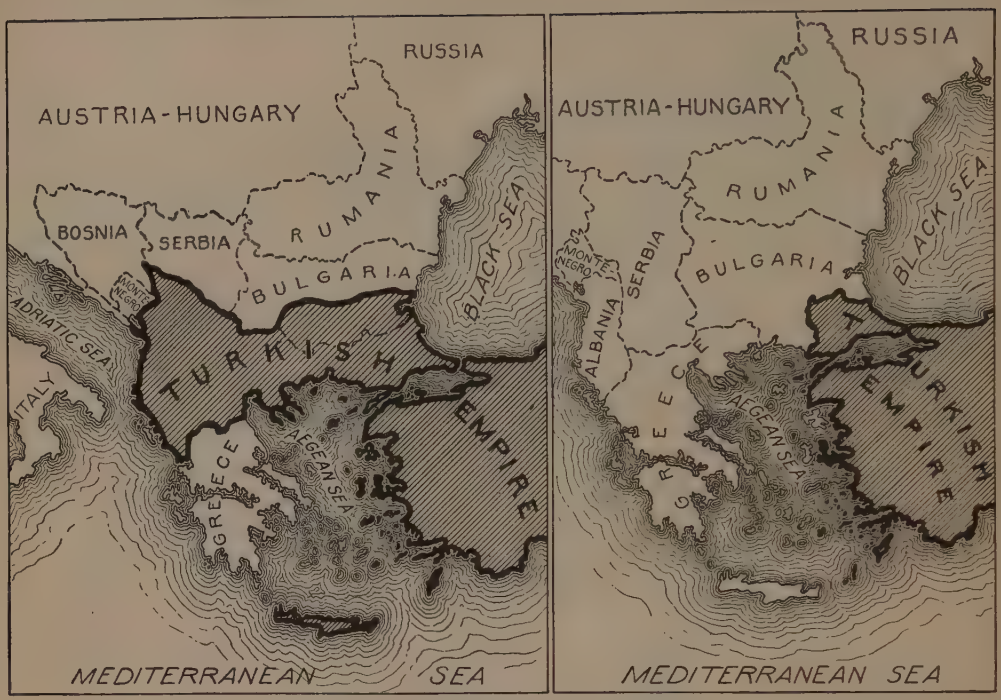
The table-land is not well adapted to agriculture, save when redeemed by irrigation, which is practiced in few sections. It is worthy of note that ancient peoples had here irrigation systems much more extensive than any which exist to-day in the region. The surface of the plateau is largely treeless, with numerous salty lakes and marshes and evidences here and there of former volcanic activity. It is essentially a grazing country, with high and low ranges of temperature. In the east there are mountain peaks 12,000 feet high.

LOCATION MAP

Mining has received little attention, but Anatolia holds riches for the future. There is gold, coal, lead, copper, salt and petroleum in abundance. Farming is conducted under adverse conditions, but grain is raised, and conditions are fair for tobacco culture and cotton raising. Characteristic products of Western Asia contribute largely to the wealth of the country, such as prunes, olives and figs. It is a land of silk culture (see illustration, in article SILK), and is likewise famous for its carpets.

Eastward and to the north lies *Armenia*, home of Christians who devotedly cling to the land of their fathers in spite of persecution which has earned them the sympathy of the enlightened world. What is known as *Kurdistan* is largely within the limits of Southern Armenia. The Russian province of Transcaucasia lies to the east, and once Armenia included its western section. Nearly the whole of this part of the empire is a table-land, with an average elevation of a mile or more above sea level. Rainfall is light, and irrigation must be resorted to. The summers are hot, so grains are ripened without difficulty. In the valleys cotton and rice are produced, and in the same sections olives and figs form a staple article of export.

The southeastern arm of Turkey contains the vilayet, or province, of *Bagdad* and the city of that name, once magnificent and powerful. The province is a little larger than the state of Ohio, but economically it is of little value. Except where watered by the Tigris and Euphrates rivers the region is arid, and it supports only 615,000 population, nearly a third of whom are




STILL SHRINKING, YET UNABASHED

At left, Turkey's boundaries as fixed by the Congress of Berlin (1878). At right, the Balkan states, showing the limits of European Turkey after the Balkan Wars (1913). See, also, map on page 554.

in its capital city. The people are Turks, Armenians, Kurds, Arabs and Jews. The inevitable Turkish rugs are a leading article of commerce, and many dates and figs are exported.

Turkey extends in a long, narrow arm south to the Indian Ocean, with the Red Sea on the west, and the Arabian Desert on the east. Arabia hopes to include this arm in its new, independent government. It is the holy spot in the empire, for it contains Mecca and Medina. At the southern tip is *Yemen,* with nearly 75,000 square miles of territory. Its principal town is Mocha, and from the region round about the world's finest coffee is produced. From the low coast the land rises gradually from a semiarid region to mountains fifty miles inland. From the mountains cool winds and a mist, which occurs almost daily, temper the heat of the lowlands. There is no railroad nearer Mocha than Mecca, 500 miles to the north. Mocha has steamship connections, but to the interior the only means of communication is by camel and caravan routes.

At the northern end of the long southern projection is *Syria,* which includes Palestine, Lebanon and Jerusalem, names imperishable in history and in religious annals. It holds the Dead Sea, the lowest body of water on the globe, its surface being almost a quarter of a mile below the level of the sea. The River Jordan and the Sea of Galilee, known also as the Sea of Tiberias and Lake of Gennesaret, also belong to this province. The climate is hot in summer, for that season is long and dry. Snow falls to some extent in winter. Olives are the principal source of income, though they are grown only in the north. Through the province from north to south runs the chain of the Lebanon Mountains, but of their famous cedars, such as King Hiram sent to Solomon for the building of the Temple at Jerusalem, only a few remain. The southern portion of Syria is arid.

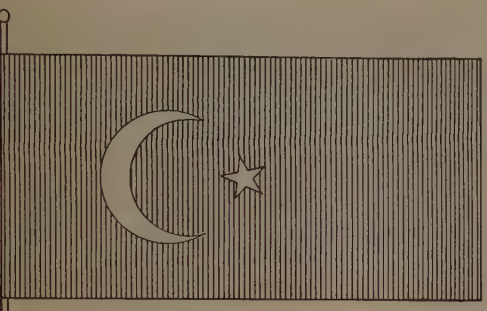
The Syrian ports are Jaffa and Beirut. In the latter city is a famous American college, whose influence throughout Western Turkey has been very great. The inhabitants are very largely Jews; Turks are few.

**Transportation.** Turkey in Europe had 1,050 miles of railroad when the War of the Nations began in 1914; Asiatic Turkey had 2,835 miles. Constantinople has direct connection with Paris and Berlin, and had not the war put a stop to development it would soon have had a rail route south through Bagdad to the Indian

Ocean, under German control. Beirut and Smyrna are railroad centers. There are electric street railway systems in Constantinople, Smyrna, Beirut and Damascus. E.D.F.

## *The Turkish Government*

In theory Turkey is a limited monarchy, the legislative power being vested in a Parliament consisting of a Senate and a Chamber of Deputies. Inasmuch as the hereditary monarch, called the sultan, appoints all the senators and



TURKISH FLAG

White crescent and star on red ground. The Turk will not tolerate the Christian Cross, therefore the Turkish substitute for the Red Cross emblem is a white flag with a red crescent.

they are indebted to him for their official existence, he easily controls legislation. As a matter of fact, Turkey is the world's most conspicuous example of intolerant autocracy. Corresponding to the office of Chancellor of the German Empire or of Prime Minister of England is the Turkish post of Grand Vizier; this head of the government is appointed by the sultan, and by him removed at will. The various departments of the government are in charge of twelve Ministers, whose positions are similar to Cabinet posts in the United States, Canada and England.

A constitution for Turkey was not granted until 1876. Two years later it was suspended and was not made effective again until 1908 (see *History,* below). One illustration of the hardships borne by the people will make clear the character of the government. There is a provision of law that the collection of the principal and heaviest tax, called *tithe,* or *dime,* shall be put up at auction and the privilege sold to the highest bidder, he to pay a lump sum to the government. This tax calls for one-tenth of the harvests and of all agricultural products—sheep, cattle, goats and all other increase in wealth of the farms. The difference between what can be collected and the amount of the bid to the government is the profit of the bidder. It is a highly speculative matter. There may be a good agricultural year, or, on the contrary, bad weather, deficient crops or too high an estimate of the amount which can be collected may greatly reduce the total. The bidder in turn engages collectors in the various villages; they put values upon the prospective crops, and to be on the safe side these are usually too high. There is no recourse open to the peasant; if he appeals, the judgment of the estimator is sure to stand.

There is no way to escape the exorbitant rate; no crop can be harvested until the authorities consent, and that consent is withheld until payment is assured. If he refuses to harvest his crops, preferring to let them rot rather than to be robbed, he only adds to his misfortunes, for the collectors are empowered to take any of his property to the amount of the tax which has been levied against him. There is, therefore, no incentive to work hard and accumulate wealth; the more apparent prosperity a peasant shows the heavier his assessment becomes. Collectors frequently do not give receipts; sometimes, therefore, the burdened taxpayer is obliged to pay his allotment a second time during a year. Often a receipt is given for a smaller sum than has been exacted; the difference goes into the pocket of the collector, and the taxpayer is required later to pay again, to make up the difference between the face of his receipt and his assessment.

The above incidents point out only a few of the government abuses. So corrupt are most of the officials that there seldom is money for public improvements. Roads remain in ill repair, and once prosperous towns, with a few notable exceptions, are slowly decaying. This statement refers to purely Turkish towns; those whose people are in the majority Christians present a somewhat better appearance.

Because of the intolerant attitude of the Turks towards "unbelievers," it was for a long time scarcely safe for foreigners to live or to travel in Turkey. Gradually, however, the Western nations wrung from the Turkish government various treaties, or "capitulations," which guaranteed to foreigners unusual privileges. At the outbreak of the War of the Nations, in 1914, Turkey abrogated all these capitulations, but the powers of Europe refused to recognize the abrogation. E.D.F.

## *History of Turkey*

**European Empire Established.** The Ottoman Turks were originally an Asiatic people, and their movement westward from their home in Iran began in the early thirteenth century, when they made their way to Asia Minor. Here Osman, or Othman, from whom their name is taken, built up an independent empire on the ruins of that of the Seljuk Turks. The Ottomans had accepted Mohammedanism centuries before, and religious fanaticism combined with desire for power to confirm them in their aggressive policy. The eight strong sultans who followed Osman not only spread their rule over all of Asia Minor, but extended it into Europe as well, gaining possession of Serbia, Bulgaria and Macedonia.

More than once the Turkish armies were led against the great stronghold of Constantinople in vain, but in 1451 a ruler came to the throne who set the capture of that city before him as the one great aim of his reign. This was Mohammed II, known as "the Conqueror." A fort was built on the European side of the Bosporus, a monster cannon and great siege engines were manufactured, and in 1453 the siege was begun. About 200,000 fanatical Mohammedans were engaged in the assault, while within the city there were massed only about 8,000 fighting men. After fifty-three days the city fell, on May 29, and the Byzantine Empire was at an end. The European part of the Turkish Empire was not the larger, but it was recognized as the more important and desirable, and Constantinople was made the center of Turkish rule.

**Centuries of Conflict.** Mohammed II attempted wider conquests in Europe, aiming especially at Hungary, and in 1456 he besieged Belgrade, but the city was relieved by Hunyady, and Hungary was saved for a time. However, the empire continued to prosper for about a century, and under Solyman the Magnificent (1520-1565) it reached the height of its power and splendor. Belgrade was taken, the Hungarians were completely defeated at Mohács, and Vienna was subjected to siege.

The sultans after the time of Solyman began to show that effeminacy and love of luxury which are so often the result of success, and the glory of the Ottoman state declined. In 1571 the fleets of Venice and Spain inflicted a severe defeat upon the Turkish fleet in the memorable Battle of Lepanto, and in the years that followed Persia recaptured considerable territory in Asia. At Saint Gotthard the Turkish armies were defeated by the Austrians in 1664, but the treaty that followed was not disadvantageous to the Turks. Nineteen years later Vienna was again besieged by the Turkish forces, but John Sobieski relieved the city and saved Central Europe from coming under the sway of Mohammedanism.

Early in the eighteenth century the Turks came into conflict with another enemy, with which they were destined to be at war intermittently for over two centuries. This new enemy was Russia, which, during the reign of Peter the Great, had become a power to be reckoned with. By 1774 Russia had gained such an advantage that Turkey was forced to give up the Crimea and other territory in the region of the Black Sea, open its waters to Russian vessels, and allow Russia a protectorate over Wallachia and Moldavia. Another war, which lasted from 1787 to 1791, ended in further territorial loss to the Turks.

**The Nineteenth Century.** Turkey did not escape the struggle of the Napoleonic Era, but Egypt, which was captured by Napoleon in one of his early campaigns, was later restored by England. From 1806 to 1812 Turkey was at war with Russia and at the close was obliged to give up all claim to the territory between the Dniester and the Pruth. In 1821 Greece declared itself independent, and after an heroic struggle made good its claim. The Peace of Adrianople, which closed the Russo-Turkish War of 1828-1829, loosened Turkey's hold on some of its other dependencies.

Between 1831 and 1839 there was intermittent warfare between Mehemet Ali, viceroy of Egypt, and his liege lord, the sultan, and only the intervention of other European powers prevented the complete overthrow of Turkey. As it was, Mehemet Ali was recognized as hereditary viceroy of Egypt, owing allegiance, however, to Turkey.

Meanwhile the Eastern Question, as it was called, had become a decided factor in the politics of Europe. Russia was determined to take advantage of Turkey's gradual weakening to aggrandize itself, while the other great powers desired the preservation of Turkish integrity, that Russia might not profit too much. Thus in the Crimean War Turkey had England and France as allies against Russia (see CRIMEA, subhead *Crimean War*). The problem was by no means settled, however, and when, in the years following 1875, the Montenegrins, Serbi-

# TURKEY

A Mosque in Constantinople

Costumes in Turkey

Making a Round Boat on the Tigris

Traces of a Vanished Civilization, at Sardis

Sea-Wall at Jaffa, Ancient Joppa. From this port Jonah took passage for Tarshish

ans and Bulgarians rose in revolt against Turkey because of its inhuman treatment of its Christian subjects, Russia announced itself as the champion of the Christian citizens of Turkey.

The Russo-Turkish War of 1877-1878 followed, in which the Turks were defeated and compelled to agree to terms which meant the practical disruption of the Empire. Again the powers intervened, however, and in the Congress of Berlin made Russia surrender a large part of the advantage gained. In 1881 Thessaly and a part of Epirus were ceded to Greece; in 1882 Egypt was occupied by England, and in 1885 the revolution at Philippopolis compelled Turkey to consent to the annexation of Eastern Rumelia, its choicest province, to Bulgaria.

A most cold-blooded massacre of tens of thousands of Armenian Christians in 1895-1896 aroused much sympathy among the nations of Europe and America, and protests were registered, but Turkey took no heed. Fear of precipitating a general European war prevented the nations from taking any effective steps to remedy the desperate conditions. The "Sick Man of Europe," as Turkey had long been called, was recognized as a menace, but jealousy among the powers prevented them from putting him out of the way.

**The Period of "Reforms."** Meanwhile, within the empire revolts were almost constant. An especially serious one in Macedonia in 1903, which the Turks attempted to put down by brutal massacres, led to the intervention of the Western nations, whose governments demanded reforms. The sultan promised much but performed little, and internal matters went from bad to worse. In 1908 a reform party, the Young Turks, fired with patriotic dreams of a recreated, modern Turkey, made a demand for constitutional government, and forced the sultan to accede to their demands. The first parliament met in 1909. These disturbances gave the neighboring states the opportunity for which they had been waiting, for Austria-Hungary promptly announced the annexation of Bosnia and Herzegovina, and Bulgaria proclaimed its complete independence and its elevation to the rank of a kingdom.

The Young Turks found difficulty in establishing their reform principles in Constantinople, and in 1909 they were forced to put down a serious revolt. Since this had had the support of the sultan, Abd-ul-Hamid, they deposed him and made his brother, Mohammed V, sultan in his stead.

**A Time of Wars.** In 1911 war broke out with Italy, owing to disputes over African possessions, and in October, 1912, when the struggle closed, Turkey gave up its hold on Tripoli and Cyrenaica. Then, before the exhausted country had recovered from this brief but sharp conflict, the allied Balkan states declared war on Turkey (see BALKAN WARS). At the end of this war Turkey was compelled to give up all its European territory but Constantinople, Adrianople, and a little of the surrounding region.

France and England had made no attempt during the Balkan War to save Turkey from humiliation, and consequently when, in 1914, the War of the Nations broke out, Turkey had no kindly feelings towards those countries. Germany, on the other hand, had been gradually gaining a hold on Turkey, and in November, 1914, Turkey declared itself an ally of the central powers. It was difficult in the months that followed to separate the true from the false in the rumors that reached the outside world from Turkey, but it was reported that German officers had accepted the posts of Minister of War and Minister of Marine in the Turkish Cabinet.

Germany hoped much from the alliance of Turkey, believing that the armies of that country would be able to engage large divisions of the Russian and British colonial troops, who would thus be unable to take part in the operations in France and in Poland. The plans of the allies with reference to Turkey centered about the attack on the Dardanelles. Once that strait was forced, they would have Constantinople at their mercy, and Turkey would be almost eliminated from the war. In February, 1915, therefore, a powerful fleet was sent to the Dardanelles, for the allies realized that the task they were engaged upon would prove difficult. The forts of the entrance were speedily silenced, but when the Narrows, fifteen miles farther up, were reached, the forts there opened fire, and the French and British fleets were forced to withdraw, with a loss of three battleships and more than 2,000 men.

An attempt was then made to accomplish by means of a land attack what had proved impossible to the navy, and in April, 1915, an Anglo-French force was landed on the Gallipoli Peninsula. Gains were made at various points, but the campaign as a whole failed, and the allied forces withdrew in December, admitting defeat. It was known later that had they continued the assault a few days longer they would have succeeded.

# OUTLINE AND QUESTIONS ON TURKEY

## Outline

**I. Location and Size**

(1) Largest part in Asia
(2) Small portions in Europe
  (a) European part of greater importance
(3) Total area

**II. The Land and Its Resources**

(1) Asia Minor
  (a) Physical features
  (b) Industries
(2) Armenia
  (a) Physical features
  (b) Products
(3) Bagdad
  (a) Importance of capital city
(4) Arabian Peninsula
  (a) Syria

**III. The People**

(1) Races
(2) Downtrodden condition of people
(3) Three classes of subjects
(4) Population
  (a) Total—21,300,000
  (b) European—1,900,000
(5) The cities

**IV. Transportation**

(1) Total mileage
(2) Railroad centers
(3) Electric lines

**V. Government**

(1) In theory—a limited monarchy
(2) In practice—intolerant autocracy
(3) Forms of government
  (a) Hereditary monarch, the sultan
  (b) Parliament
  (c) Grand Vizier
  (d) Cabinet or Porte
(4) Injustice of tax system

**VI. History**

(1) Empire in Europe founded
  (a) Fall of Constantinople
  (b) Later conquests
(2) Conflict with Russia
  (a) Crimea surrendered
  (b) Eastern question
  (c) Crimean War
  (d) Russo-Turkish War
(3) Internal struggles
(4) Balkan War
  (a) Great loss of territory
(5) War of the Nations

## Questions

How many countries as large as European Turkey could be made out of Asiatic Turkey?

Who founded the capital of Turkey? What part has it played in history?

What is the meaning of the statement that "grass never grows where the Turkish hoof has trod"?

What principle of Mohammedanism makes it dangerous for Christians to live in Turkish dominions?

Why is it no advantage to a Turkish peasant to try to increase his property and better his living conditions?

What city that is still of importance suggests the *Arabian Nights?* Which ones suggest important Biblical events?

Where is the Levant? What does the name mean? For what is it famous? (See LEVANT.)

Why is the long, narrow strip of land to the west of the Arabian Desert of such importance to the Moslems?

Since Turkey has a Constitution, a Parliament and a Cabinet, how can it be called an intolerant autocracy?

What is the *tithe* or *dime,* and what is the reason for auctioning off the privilege of collecting it?

During 1915 the world was aroused by accounts of the persecution by the Turks of Armenian Christians in Northeastern Asia Minor. Villages were wiped out; men, women and children by hundreds of thousands were massacred or driven from their homes to die by the wayside of exposure or starvation. Detailed statistics cannot be known, but those in charge of the relief work declared that no fewer than 500,000 had been massacred and 1,000,000 deported. Charges were made against the German government in connection with these atrocities, some not hesitating to declare that Germany had actually instigated them, while others merely contended that it had done nothing to prevent them.

Early in 1916 the Russians conducted a successful campaign in Armenia, and succeeded in February in capturing Erzerum, considered the most strongly fortified city in Asiatic Turkey. It was believed that this might help to open the way to Constantinople or to Bagdad, but the victory proved to have no such important results. In April the Russians captured Trebizond, and three months later Erzingan, an important strategic center, fell. For further information, see WAR OF THE NATIONS. A.MC C.

Consult Garnett's *Turkish Life in Town and Country;* Ferriman's *Turkey and the Turks* (in Europe); Percy's *The Highlands of Asiatic Turkey;* Gibbons' *The Foundation of the Ottoman Empire.*

**Related Subjects.** The reader who is interested in Turkey will find much that is helpful in the following articles in these volumes:

CITIES

| | |
|---|---|
| Adrianople | Damascus |
| Aleppo | Jerusalem |
| Angora | Mecca |
| Bagdad | Medina |
| Beirut | Smyrna |
| Constantinople | Trebizond |

DEPENDENCIES

| | |
|---|---|
| Armenia | Palestine |
| Asia Minor | Syria |
| Kurdistan | Yemen |
| Mesopotamia | |

HISTORY

| | |
|---|---|
| Abd-ul-Hamid | Gallipoli |
| Balance of Power | Mohammed V |
| Balkan Wars | Russia, subtitle *History* |
| Berlin, Congress of | Russo-Turkish Wars |
| Bosporus | Seljuks |
| Byzantine Empire | Solyman II |
| Crimea | War of the Nations |
| Dardanelles | Young Turks |

ISLANDS

| | |
|---|---|
| Rhodes | Scio |

LEADING PRODUCTS

| | |
|---|---|
| Carpets and Rugs | Fig |
| Date and the Date Palm | Olive |

RIVERS

| | |
|---|---|
| Euphrates | Tigris |
| Jordan | |

UNCLASSIFIED

| | |
|---|---|
| Koran | Turks |
| Mohammedanism | |

**TURKEY,** a group of game birds related to the pheasants and native to North America. There are but two species—the Yucatan and Central American turkey, a small, brilliantly-colored bird with eyelike spots on the tail

How bless'd, how envied, were our life,
Could we but 'scape the poulterer's knife!
But man, curs'd man, on Turkeys preys,
And Christmas shortens all our days:
Sometimes with oysters we combine,
Sometimes assist the savory chine;
From the low peasant to the lord,
The Turkey smokes on every board.
—GAY: *Fables.*

coverts; and the wild turkeys of Mexico and the United States, representing five subspecies. The wild turkey of Southern Mexico is the breed from which the domesticated turkey of the poultry yard is derived—the turkey that finds a place on the dinner table at Thanksgiving time and at Christmas festivities in countless homes.

The common wild turkey was once abundant as far north as Maine and Southern Ontario, and is the noblest game bird in America. Unfortunately, it is rapidly approaching extinction. The adult male is about four feet long and is clothed in handsome plumage with metallic-green, copper and bronze reflections. The body feathers are tipped with black and the tail and upper tail coverts with chestnut. A long tuft of bristlelike feathers hangs from the center of

he breast, the legs are spurred, and wattles are ound on the head and neck, which are bare of eathers. The female is smaller and less martly colored, and she lacks the tuft of ristles.

In their native haunts in the forests these urkeys congregate in small flocks, coming into he open only to secure food. They are fond f nuts, seeds, insects, berries and other small ruits. At night they roost in the trees. The rude nests, lined with dry leaves, are placed on he ground. Turkey eggs are about twice as arge as those of the common fowl, and are pale ream-buff, speckled with brown. There are rom ten to fourteen in a brood. The domestic urkey resembles the wild species, but the lumage is less brilliant. It is a valuable item n the poultry business because its flesh is de- icious and nutritious. The number of turkeys aised by poultrymen, however, is much less han the number of chickens, partly because the ggs of the latter are more valuable, and partly ecause there is a greater demand for the maller and less expensive fowl. In general, urkeys require about the same care as chick- ns. See POULTRY.

Consult McIlhenny's *The Wild Turkey and Its Hunting.*

**TURKEY BUZZARD,** *buz'ard,* or **TURKEY VUL'TURE,** the most common of American ultures (see VULTURE), having glossy black lumage edged with grayish-brown, and a bright ed head and neck. It is about thirty inches

THE TURKEY BUZZARD

ong, with a wing breadth of six feet, and can e distinguished at a distance by the upturned nds of its wings. In common with other vul- ures, it has the disgusting habit of gorging it- elf on the decomposing flesh of dead animals, nd when disturbed vomiting up the mass be- ore it attempts to fly. It is considered of value s a scavenger. It nests in hollow stumps or ogs, or on the ground under palmettos or bushes. The two handsome eggs are of a creamy color, mottled with reddish-brown or chocolate. These vultures range from Canada to Mexico.

**TURKS,** in a broad sense the name of the Mohammedan subjects of the sultan of Turkey. The name is applied more specifically to the conquerors of Constantinople and the inhabitants of the region in Asia known as Turkey. There are various other peoples, however, who belong to the same group linguistically; that is, who speak the Turkish language. These include the Russian Tatars (or Tartars), the Turkoman tribes living between the Caspian Sea and the Oxus River (in Central Asia), the Kirghiz and other nomadic tribes of Asia.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Kirghiz | Tartars |
| Seljuks | Turkey |

**TURMERIC,** *tur'mer ik,* the name of a plant native to Southern Asia, the fleshy roots of which are the source of a substance, also called turmeric, which is used mainly for dyeing. The word is derived apparently from the Latin *terra merita,* meaning *deserved or excellent earth;* some authorities, however, regard it as a corruption of the Arabic *kurkum,* meaning *saffron.* The roots are hard and tough; externally they are brownish or yellowish-green, but when broken show a resinous interior which varies from orange-brown to deep reddish-brown. The roots are prepared for the market by being cleaned and then dried in an oven. The yellowish powder which they yield when ground has a strong aromatic odor.

Turmeric has been used for centuries as a dyestuff and as a condiment, and it is an important ingredient of curry powder. It does not yield a fast color, however, as a dyestuff. It has gone out of use as a medicine, but in India it forms, when mixed with milk, a cooling lotion for the skin and eyes. Turmeric is useful in chemistry in making test papers for alkalies, for on the addition of alkali white paper soaked in a tincture of turmeric turns to reddish-brown, and on drying, to violet.

**TUR'NER,** JOSEPH MALLORD (1775-1851), an English painter, considered by many competent critics to be the greatest artist of the English school of landscape painting. Public appreciation of his work has been decidedly affected by Ruskin's praise of it in *Modern Painters,* though Turner won high honors in his day. His father, a London barber, recognized the boy's talent, and encouraged it in every

way possible. He taught his son to read, permitted him to neglect regular schooling for art study, and had him enter the Royal Academy in 1789. The next year, when Turner was but fifteen years old, he exhibited his first picture, a view of Lambeth Palace.

During his period of development, which continued until about 1800, he made designs for magazine prints, mastered the technique of water-color painting, and became known as one of the promising landscape artists of the day. About 1802, the year of his election to membership in the Royal Academy, he began to paint in oils, and during the next fifty years exhibited nearly two hundred pictures at that institution. When he died he bequeathed his valuable collection of paintings, engravings and sketches to the nation, and this collection may be seen to-day in Turner Gallery, occupying two rooms of the National Gallery.

Turner was a devoted student of nature, and to obtain material for his pictures he was accustomed to go away alone on sketching tours, through England, France, Switzerland and Italy. He depicted natural scenes with the brush of an idealist, not a realist, and his work has a high poetic quality that Ruskin calls the "Turnerian mystery." He used light and color in such a way as to create an effect of indistinctness, and at the same time his coloring was striking, even brilliant. Unfortunately he did not fully understand how to mix oil colors, and some of his finest works have greatly deteriorated. As a master of water color and of etching and engraving, however, he ranks with the best.

There are numerous Turner collections in America, and one may see good examples of his work in the Metropolitan Museum and the New York Public Library. His *Grand Canal, Venice,* which is admired for its beautiful treatment of sky and water, and *The Castle of Indolence,* are in the Metropolitan collection. The Boston Museum possesses his *Slave Ship,* and the New York Public Library his *Staffa, Fingal's Cave.* His most popular picture, *The Fighting Téméraire,* shown herewith in faithful reproduction, is in the Turner collection of the National Gallery. Other famous works are *Shipwreck, Sun Rising in the Mist, Bay of Baiae* and *The Splügen,* an Alpine scene. R.D.M.

Consult Armstrong's *Life of Turner;* Phythian's *Turner.*

**TURNER,** Nat, a slave who became famous in American history as the leader of the Nat Turner Insurrection (which see).

**TUR'NIP,** a common biennial plant of the mustard family, cultivated in gardens and fields for its fleshy root, which is used as a table and stock food. There are numerous varieties of turnips, and their roots vary considerably in shape. Some are elongated, some are round, others are broadened out, and some are spindle - shaped. The flesh is whitish or yellowish. Garden varieties are usually smaller and of more delicate flavor than field varieties. If the roots are desired for early summer use the seed must be sown in the spring as soon as the ground can be worked, but planting for winter turnips need not take place until the middle of July, or even later. In the cultivation of garden turnips the seeds are sown in shallow drills fifteen inches apart and the plants are thinned until they are from four to six inches apart in the row. In field culture the seed may be sown broadcast or in drills two or two and a half feet apart. Careful hoeing is essential.

TURNIPS
Fleshy roots and tops.

The roots will have a sweeter flavor if not dug until they have had a touch of frost. They may be stored for winter use in damp earth, sand or leaves, but a cellar with earth walls and floor makes a good storage house. If piled in heaps on the floor and covered with earth they will keep indefinitely. Turnips are about nine-tenths water and have a low percentage of nutriment, but they can be cooked and served in an appetizing way, and they give variety to a meal. Large quantities of field turnips are fed to stock in Great Britain, Europe and Canada, and to some extent in the United States.

A species known as the *Swedish turnip,* or *rutabaga,* has a large root of firm flesh, pronounced flavor and yellow color. The rutabaga is used as a stock food more extensively than the ordinary turnip; sheep prefer it to all other varieties. M.W.

Consult *Cornell Experiment Station Bulletin No. 317,* published by the New York State Agricultural College, Ithaca, N. Y.

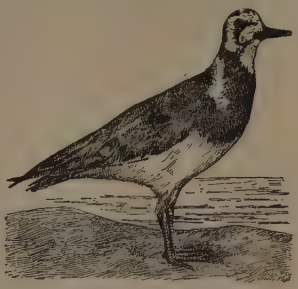
THE FIGHTING TEMERAIRE

THE FIGHTING TÉMÉRAIRE. When it was announced that the most famous ship in the American navy, the *Constitution*, was to be destroyed, a young Bostonian, in a burst of patriotism, wrote a little poem which saved the old ship. What Holmes by his *Old Ironsides* did for the *Constitution*, Turner did for the *Fighting Téméraire*. True, he did not "save the old ship alive," for the announced intention was carried out and the ship was broken up; but he made it a thing of immortal beauty, which will never lose its appeal to the eyes and the hearts of picture-lovers.

*The Fighting Téméraire* was one of Nelson's vessels at Trafalgar. It moved next to his flagship, and gallantly led the ships of England through the French line, but it was so seriously disabled that it could never fight again. When, some years later, it was being towed up the Thames on its final journey, Turner saw it, and his love for the sea and his strong national feeling sensed it as a fit subject for a painting. The glowing red of the sunset; the quiet water in which are mirrored deep the old ship and its busy, puffing little tug; the golden mystical haze which Turner knew better than any other artist how to impart to his pictures—these are the chief artistic beauties. But stronger than these is the emotional appeal of the brave ship, its last battle fought, its decks untrodden, its masts dim and ghostly, moving on to destruction. "Of all pictures and subjects not visibly involving human pain," wrote Ruskin, "this is, I believe, the most pathetic that was ever painted," and no one who looks at it sympathetically can doubt the justice of his statement.

L. J. B.

**TURN'STONE,** a small sea bird, about nine inches long, with variegated plumage of black, white and reddish-brown. It frequents the outer beaches of most seacoasts, and is named from its habit of constantly turning over shells and pebbles, its slightly upturned bill being adapted to this method of searching for food. Turnstones nest in the Arctic regions and migrate in winter to far southern shores. Their nests are hollows in the ground near water. The eggs are usually four in number and of a grayish color, spotted and blotched with brown or lilac.



THE TURNSTONE

**TURNVEREIN,** *toorn'fer ine,* a name given to the athletic organizations established in Germany about the beginning of the nineteenth century by Friedrich Ludwig Jahn, and to similar organizations in America. The organizations occupied most of Jahn's attention after the Napoleonic wars; their membership rapidly increased, and they had an enormous influence in building up a vigorous and hardy generation. The first societies in the United States were formed in Philadelphia and Cincinnati in 1848 by German refugees, and such societies are now to be found in most large centers of German population in this country. The membership in America is about 40,000. See JAHN, FRIEDRICH.

**TUR'PENTINE.** Turpentine is obtained from several species of the pine tree, which in the spring is slashed across its trunk with an ax. In the cuts thus made the sap collects in the form of a gum or thick, sticky, clear semifluid. This is collected and placed in copper vats over a fire, the heat distilling the gaseous or volatile parts of the gum or sap over into a worm. This worm is cooled by water, and the contained gas or vapor condenses to form spirits of turpentine. The part left in the first vat forms the *resin* of commerce and is placed in barrels for shipment. The spirits of turpentine, however, will ooze through ordinary wooden barrels, so special containers are prepared by coating the inside of the barrel with several coats of glue, which, when it hardens, holds the turpentine perfectly.

The oil of turpentine is a yellowish, highly inflammable oil, of strong, peculiar odor and hot, biting taste.

**Internal and External Action.** It is only used internally when specially prepared (rectified), and it then produces a sense of warmth in the stomach, a sense of exhilaration, dizziness and mild intoxication. The pulse beats stronger and more rapidly. It is given forth again by the breath, to which it imparts its odor, and by the urine, to which it imparts the odor of violets.

The oil alone, or mixed into a liniment and rubbed on the body, produces redness of the skin and a sense of warmth; but sometimes inflammation is produced.

**Use as Medicine.** In the form of a liniment it is used for sprains or strains, while the oil itself is applied externally in pleurisy and bronchitis. Mixed with injections in the intestines, it materially assists in the expelling of wind or gas. It is an efficient worm-expelling remedy, and is used also for ulceration of the stomach and intestines. In typhoid fever it acts favorably, assisting to heal the ulcerations of the bowel, which are characteristic of this fever, and aiding also in the expulsion of gas, which greatly distresses the patient. In certain forms of urinary difficulties depending on relaxed kidneys it exerts a stimulating, contracting influence which is helpful in relieving the difficulty. Like all other medicinal agents, turpentine should not be taken except on a physician's prescription. C.B.B.

**TURQUOISE,** *tur'koiz,* or *tur'kwoiz,* a beautiful, semiprecious stone of delicate green or blue shades. The color most prized is the robin's-egg blue. In chemical composition the turquoise is a phosphate of aluminum, and the color is due to the presence of copper. When the stone is heated, moisture escapes and the color becomes lighter. From this phenomenon arose the superstition that the fading of the color was a sign of misfortune. The turquoise is the national stone of Persia, and it is much admired by Orientals, who believe that it possesses healing power.

The stone is found in igneous and volcanic rocks in Mexico, in New Mexico, Colorado, Arizona, Nevada and California, and in Persia, Asia Minor, Turkestan and Siberia. The price of the cut stones depends upon the size, color and polish. A very handsome turquoise may be purchased for six or eight dollars. Fossil bone colored blue by phosphate of iron, which is called *odontolite,* or *bone turquoise,* looks very much like turquoise, but the two can be easily distinguished when seen under a microscope. The turquoise is the birthstone for December. See BIRTHSTONES; GEMS.

**TURTLE,** *tur'ti'l,* the general name for a group of marine and fresh-water reptiles having the body encased in a bony upper and lower shell attached to the ribs and vertebrae. *Tortoise* is applied more especially to land forms,

SOFT-SHELL TURTLE

though the names are sometimes used interchangeably. Turtle shells are in two parts, the upper portion being known as the *carapace,* and the lower as the *plastron.* An exception to this is the leathery covering of the *leatherback turtle* (which see), which is all in one piece. In some species the shells have beautiful markings; that of the *hawksbill* is the source of so-called tortoise shell (see TORTOISE). Turtles have no teeth, but the jaws are edged with tough, horny skin, and in some species they give the ugly, flattened head a terrifying appearance. The limbs protruding from the shell covering are clumsy, paddle-shaped objects, terminating in webbed claws. Legs, neck and tail are encased in a horny covering, and all can at will be drawn inward between the two parts of the shell, out of sight.

Mollusks, seaweed, fish, earthworms and insect larvae are eaten by turtles, but some species feed principally on vegetable life. The eggs are usually deposited in holes in sandy slopes, covered with sand and left to hatch by the heat of the sun. Young turtles as soon as they emerge from the eggs begin to crawl about, and soon find their way to the water.

Of the species eaten by man, the most valuable is the *green turtle,* the flesh of which makes a delicious soup. This is a large marine species found in both the Atlantic and the Pacific waters. It sometimes reaches a weight of 350 pounds. Both the flesh and eggs are valued as food. Among other edible forms is the *snapping turtle* (see below). See, also, TERRAPIN.

**Snapping Turtle.** This name is applied to a group of large fresh-water turtles having keen-edged jaws, with which they fight viciously. The *common snapping turtle* of America is distributed from Southern Canada as far south as Ecuador, and it frequents sluggish, muddy streams and marsh ponds. The carapace is dull olive or dark brown, and has few markings. Average specimens are over two feet long from tip of tail to head, and weigh about thirty-two pounds. The snapping turtle has a large, powerful head and the jaws are provided with strong hooks; when attacked it thrusts out its head with the rapidity of a snake and fastens its jaws in the enemy so viciously as to inflict a serious wound. It feeds only on animal life, and is fond of young waterfowl. Both its flesh and eggs are esteemed as food. A species found only in the streams of the Southern states is the huge *alligator snapping turtle,* averaging over a hundred pounds in weight. The jaws of large specimens are powerful enough to amputate the hand or foot of a man.

**Soft-Shell Turtle.** This group consists of twenty-seven species, found in North America, Asia and Africa. These turtles have soft, leathery shells, and, as another marked characteristic, a long, retractile neck. In the Southern United States, where soft-shell turtles are common, they are called *flapjacks.* G.B.D.

Consult Williston's *Water Reptiles of the Past and Present.*

**TURTLEDOVE,** a small dove found throughout the Old World, usually nesting in temperate regions and migrating in winter to warm latitudes. In spring it has a plaintive, cooing note. The turtledove of Europe is of an ashen

THE TURTLEDOVE

color, tinged with wine red. It inhabits woods and plantations and feeds on seeds and grain. Being shy, it is seldom seen. Its nest is loosely built and placed in a low tree or hedge. The eggs are creamy-white in color and two in number. Two broods are reared in a season.

The similar North American species is known as the *mourning dove* (see DOVE).

**TUSCALOOSA,** *tus ka loo' sa,* ALA., the county seat of Tuscaloosa County, is situated northwest of the geographical center of the state, on the Black Warrior River. It is fifty-six miles southwest of Birmingham, 107 miles northwest of Montgomery, the state capital, and 199 miles southwest of Chattanooga. Transportation is provided by the Alabama Great Southern, the Louisville & Nashville and the Mobile & Ohio railways, and by river boats to Mobile. In 1910 the population was 8,407; in 1916 it was 10,488 (Federal estimate). The area exceeds three square miles.

Tuscaloosa is the trade center for a rich agricultural, mineral and lumber district. Cotton is the principal crop, but grain, sugar cane, sorghum, vegetables and nuts are also cultivated. There are extensive coal mines in the vicinity, and at Holt, a suburb, there are coke ovens, a blast furnace and other plants connected with mining. The leading industrial establishments of Tuscaloosa are cotton factories, cottonseed oil and lumber mills, fertilizer factories, metal works and creameries. The city has a Federal building, erected in 1905 at a cost of $150,000; the old state capitol; the county courthouse, and the Alabama-Bryce Hospital for the Insane. The residential district is unusually attractive. As an educational center, Tuscaloosa is prominent. Here are the University of Alabama, opened in 1831; Alabama Central Female College, Stillman Institute, the Boys' Training School and a theological school for negroes.

The first settlement made by white people was established in 1816. In 1819 the place was chartered as a city, and it was the state capital from 1826 to 1846. Since 1912 it has been governed on the commission plan. In 1915 the United States government constructed locks and dams on the Black Warrior River, twenty-eight miles from Tuscaloosa, which provide year-round navigation to the Gulf of Mexico. G.L.

**TUSCANY,** *tus' ka ni,* a province, or department, of the north-central part of Italy, smaller than the state of Rhode Island, but important because of the part it has played in the history of Italy and of the world. It borders the Mediterranean Sea, and lies north of the province of Roma (Rome). As the home of the ancient Etruscans (see ETRURIA), its history began in 1044 B.C. Seven hundred years later it became a part of the Roman Empire, but in the thirteenth century it became a republic and maintained a separate political existence for over two hundred years. In the sixteenth century the republic became a grand duchy, and two centuries later lost its independence to Germany. From 1807 to 1814 it was occupied by the French and given by them to Austria, under whose government it remained until 1861, when it was united with the Kingdom of Italy.

The people of Tuscany still retain distinct provincial characteristics, though they have lost their political independence. The chief wealth of the region is in its minerals and marble, but quantities of maize, olive oil, tobacco, chestnuts and flowers are exported. Live stock is raised, and beeswax is produced in very large quantities. The peasants are among the most prosperous of Europe. Tuscany is world famous for the city of Florence, which has been of such great influence in art and literature; it was the home of Boccaccio, Dante and Petrarch, who were the greatest story-tellers and poets of the Middle Ages, and of Giotto, who was among Europe's foremost painters. See FLORENCE.

**TUSCARORA,** *tus ka ro' ra,* the name of a tribe of North American Indians belonging to the Iroquois Confederacy. They were separated from their kindred at an early date, and were living in North Carolina when the Europeans came to America. At the beginning of the eighteenth century the Tuscaroras were divided into seven clans, occupying fifteen villages and numbering 1,200 warriors. In 1711 they attempted to annihilate the white settlers in North Carolina. In a fierce battle fought near the Neuse River, on January 28, 1712, about 400 Indians were killed or wounded. The following year another uprising occurred, and Colonel Moore of South Carolina captured 800 of them. The remaining Tuscaroras fled northward and joined the Iroquois Confederacy, being received as the Sixth Nation of that league (see FIVE NATIONS). The remnant of the tribe are to-day living in Canada and New York.

**TUSKEGEE, NORMAL AND INDUSTRIAL INSTITUTE,** at Tuskegee, Ala., an industrial school for negroes which has probably done more to lessen the seriousness of the race problem than any other agency in the United States. It was established in 1881 by act of the Alabama legislature, which appropriated $2,000. In a rented shanty church, school opened July 4, 1881, with thirty pupils and one teacher, Booker T. Washington, a graduate of Hampton Institute. As principal and instructor of the new school, he began

then a service extending over a period of thirty-three years. Under his administration Tuskegee became an institution owning 2,300 acres of land, more than a hundred buildings and various other properties, including live stock and farm implements, the whole valued at over a million and a half dollars. In 1916 the school had the services of about 185 instructors and a student attendance of 1,650.

The purpose of the courses offered is to give students a knowledge of the subjects taught in the common schools, and to train them to earn their living after they leave school. There are entrance examinations to test ability to read and write and knowledge of the fundamental processes in arithmetic. Entering pupils are enrolled either in day or evening classes. The latter are attended by those who cannot make the small cash payments required of day students, who pay part of the board fee (ten dollars a month) by working three days a week. Evening students are permitted to work out all of this fee. The industrial courses include instruction and practical work in blacksmithing, founding, painting, shoemaking and the like; for girls there are lessons in sewing, millinery, cooking, domestic service, basketry, nursing, laundering, dressmaking and mattress making. There is also an agricultural department. Training in religious and social work is furnished in the Phelps Hale Bible Training School. The practical good that is being accomplished by Tuskegee Institute cannot be overestimated. It is aiding students from every state in the Union and from over twenty foreign countries. See NEGRO.

Consult Washington's *Up from Slavery;* also his *Tuskegee and Its Peoples.*

**TUSSOCK,** *tus'uk,* **MOTH,** a family of moths containing several species, the caterpillars of which have hair growing in tufts along the back. The moths are dull colored, and in some species the females have no wings. There are about twenty kinds in the United States. The *gypsy* and *brown-tail* moths in particular have been very destructive to trees in New England. Another species common in Eastern United States is the *white-marked* moth, the male of which is small and inconspicuous, and the female is without wings. The larvae eat the soft parts of leaves until only the skeleton remains; they devastate whole orchards and ruin shade trees and forest trees.

Under the headings GYPSY MOTH and BROWN-TAIL MOTH the reader will find pictures and descriptions of these two important species.

**TWEED,** a fabric which takes its name from the district round the River Tweed in Scotland, where it was first made. Tweed is usually made of two colors combined in the same yarn, and the best quality is made entirely of wool. In inferior kinds mixtures of cotton and shoddy are introduced (see SHODDY). For men's wear and for women's tailored suits, tweed is very popular. It is made in a wide variety of colors and shades, one of the most popular being known as the *heather* mixture. Tweed is considerably less expensive in Europe than in the United States, a well-tailored tweed business suit in England costing only about $15, while a suit of the same quality in the United States would cost probably $35 or more.

**TWEED,** WILLIAM MARCY (1823-1878), an American politician whose power of leadership was used in directing one of the grossest schemes of public robbery ever known. He was the first "boss" of Tammany Hall, and the leader of what was known as the "Tweed Ring." Tweed was born in New York City, where he received a common school education. He entered political life at an early age, and while commissioner of the department of public works he organized his famous "ring." By securing the most important positions for men under his leadership and by manipulating public affairs, he gained control of the spending of public moneys and of the audit of accounts. Many schemes of city improvement were launched, notably the building of the county courthouse, an enterprise that cost considerably over $8,000,000. Members of the "ring" stole fortunes from the appropriations for their departments. Tweed was exposed, largely through the New York *Times,* brought to trial and sentenced to imprisonment and to pay a heavy fine. He was released on a legal technicality, but was rearrested and again sentenced. This time he escaped to Spain, but on his return to New York in 1876 he was imprisoned in Ludlow Street jail, where he died in April, 1878.

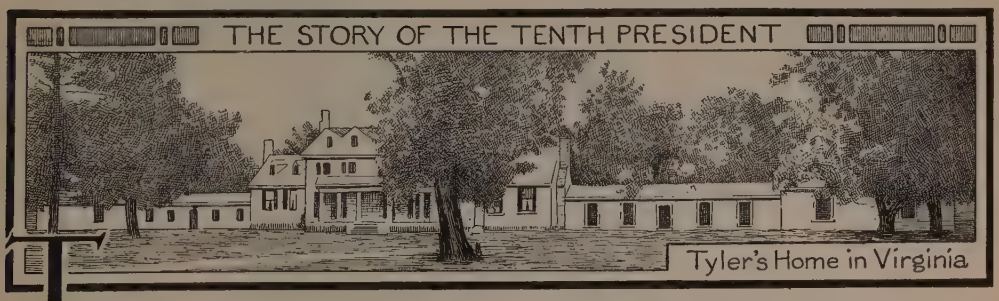
**TWELVE TABLES,** LAW OF THE, the first written law of the Romans, drawn up by ten men known as *decemvirs,* on demand of the plebeians, who had suffered by the unjust decision of patrician judges. These laws were based on the former unwritten code and on the report of a commission sent to study the laws of Greece. They were written on twelve tables of brass and fastened to the orator's platform on the Forum, where they might be read by all. For centuries they formed the base of all legislation, and every schoolboy was required

to learn them by heart. The decemvirs were elected to perform their task in 452 B.C. In 451 they submitted ten tables of the law, and the following year two others. See ROME, subhead *Written Laws,* page 5058.

**TWI'LIGHT,** a period between "the dark and the daylight," occurring immediately after the sun has sunk beneath the horizon. At this time the atmosphere is illuminated by a soft, mellow light that gradually fades away into darkness. There is a corresponding period early in the morning, just before the sun rises, which is called *dawn.* The phenomenon of twilight is due to refraction and reflection of the sun's rays. When the sun sinks from sight, the rays, on passing from the ether into the denser atmosphere surrounding the earth, are bent at an angle and continue to reach those regions from which the sun itself cannot be seen. They are made visible to the observer because they are reflected by dust and water vapor present in the upper air.

The duration of twilight varies greatly in different parts of the earth. This is due to the same causes which affect the length of day and night. It is widely believed that complete darkness follows immediately on the disappearance of the sun in the tropics, but this is not strictly true. Even at the equator twilight lasts about an hour. It has been found that twilight lasts from the time the sun sets until it is eighteen degrees below the horizon. At the equator, the path described by the sun across the earth's surface scarcely varies; similarly the length of time it takes the sun to drop eighteen degrees below the horizon does not vary. But as one travels north or south one enters zones where the path of the sun across the earth's surface changes from day to day, and thus it follows that the length of twilight varies. During the Arctic summer there is a period when the sun never drops beneath the horizon—where summer means perpetual day. Farther south the summer sun never drops as much as eighteen degrees below the horizon, so that twilight bridges the entire period between sunset and sunrise. This is true in Christiania, Norway, where the nights are so light during June and July that the shops are kept open and people are seen on the streets all night long. In the north of England, during the same months, it is never really dark, and it is often possible to read out-of-doors at ten or eleven o'clock at night. In the prairie provinces of Canada summer twilight continues so late that the league baseball games are played after seven o'clock.

**TWILIGHT SLEEP.** See ANESTHETIC.




**TYLER,** JOHN (1790-1862), an American statesman, tenth President of the United States. Tyler was elected as Vice-President, with William Henry Harrison as President, but the latter's death elevated Tyler to the Presidential chair. Tyler thus was the first man to become President who was not elected to that office. It is a curious fact that this first "accidental President" established precedents which have been followed in some degree by most of the later Presidents who have attained this office in a similar manner. Tyler became President by the votes of a party of which he was not at heart a member, and in his course as President he acted not according to the demands of that party but in obedience to his own conscience. His independence made his reëlection impossible, just as it made impossible the reëlection of every succeeding "accidental President," with the single exception of Roosevelt. Throughout his career this independence of thought and action was Tyler's strongest characteristic. He was loyal to principles and ideals; he was loyal to individuals only as they supported his principles or furthered his ideals. Had he been weaker and more easily influenced, his Presidency might have been marked by many achievements. Even under the conditions that existed it is marked by the Webster-Ashburton Treaty and the annexation of Texas.

John Tyler was born at Greenway, Charles City County, Virginia, on March 29, 1790. His father, Judge John Tyler, was a distinguished Virginian, who was at various times speaker of the Virginia house of delegates, governor of Virginia, and a judge on the state and Federal benches. After attending John McMurdo's school, young Tyler entered William and Mary College, where he showed a strong interest in ancient history. He was also fond of poetry, and like another great Virginian, Thomas Jefferson, was an excellent amateur violinist.

At his graduation from college Tyler was seventeen years old; at nineteen he began to practice law, and at twenty-one he began his public career as a member of the Virginia legislature. In that body he served until 1816, during this period being a conspicuous defender of President Madison's policies during the War of 1812. Tyler was married in 1813, on the anniversary of his birthday, and a few weeks later was called into service to head a militia company for the defense of Richmond, which was then threatened by the British. Tyler's company, however, did not get into action, and it disbanded after a month.

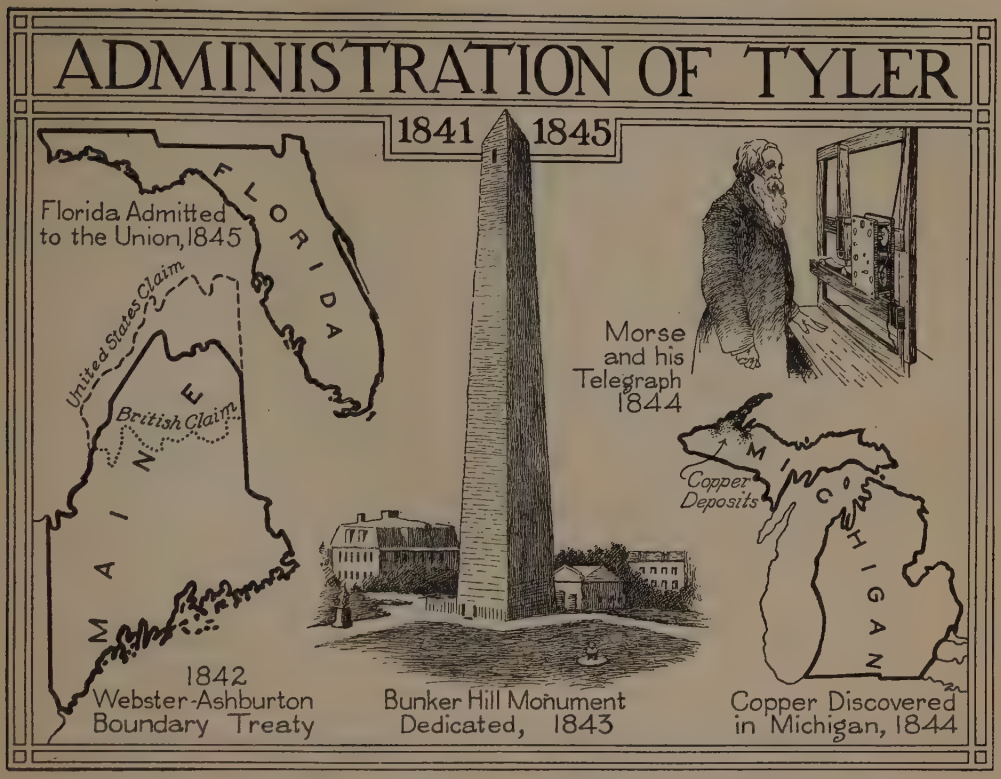
In November, 1816, he was elected to fill a vacancy in the Federal House of Representatives. At the next regular election, when he was chosen for the full term, he received every vote but one cast in Charles City County. In Congress he quickly displayed his characteristic independence. He was a strict constructionist, and he opposed measures, no matter what their origin, which involved a liberal interpretation of the Constitution. Thus he voted against Calhoun's bill providing for internal improvements, opposed a national bankruptcy act, condemned Andrew Jackson's course in Florida and denounced the Bank of the United States. His course certainly met the approval of his constituents, for in 1819 he was unanimously reëlected, although he had made no effort to influence the voters except to send them copies of his principal speech against the Bank. In the next Congress, in which the extension of slavery was the chief subject for discussion, Tyler argued that Congress had no right to restrict the extension of slavery, and he voted against the Missouri Compromise, but at the same time he insisted that he was personally opposed to the perpetuation of that institution.

In 1821, feeling that his health was impaired, he refused to serve longer, and for two years held no public office. In 1823, however, he was again elected to the Virginia legislature, and in the next year was an unsuccessful candidate for the United States Senate. From December, 1825, to the same month of 1826, he was governor of Virginia. At this time political parties in the United States were undergoing a transition. The Democratic party in Virginia became divided into two groups, one of which was led by John Randolph, an ardent supporter of Jackson. The other group, including Tyler, also opposed the policies of Adams's administration, but maintained a certain independence of the Jackson men. In 1826, in fact, the independent Democrats in the Virginia legislature, with the assistance of the Clay and Adams supporters, elected Tyler to the United States Senate.

In that body Tyler quickly displayed his strongest characteristic—independence. He opposed the "Tariff of Abominations" of 1828,

JOHN TYLER
The first man to become President of the United States without election by the electoral college.

although it was supported by the administration. On the other hand, he voted to confirm Jackson's appointment of Van Buren as minister to Great Britain. He disapproved of nullification and strongly condemned the attitude of Calhoun and South Carolina as both unconstitutional and impolitic, but at the same time he was bitter against Jackson for his coercive policy. In 1833, when the Force Bill came to a vote, some of its opponents in the Senate made it a point to be absent, and others left the chamber while the balloting was in progress. When the vote was recorded, it stood: yeas, thirty-two; nay, John Tyler.




In 1834 Tyler again showed his willingness to act independently of his party. Like Jackson, he believed that the Bank of the United States was "the original sin against the Constitution, which, in the progress of our history, has called into existence a numerous progeny of usurpations." Strongly as he disapproved of the Bank, Tyler could not countenance President Jackson's methods of fighting it, and when the President ordered the removal of the government's deposits, Tyler openly broke with the administration. In February, 1834, he proposed to submit a constitutional amendment, either directly forbidding or permitting a national bank, but nothing came of this plan, because Calhoun held aloof.

The course of events during 1834 and 1835 proved beyond doubt that there was a serious split in the Democratic party. Not only had Calhoun and the nullifiers broken away, but the larger body of "States' Rights Whigs" was formed out of anti-Jackson Democrats. The States' Rights Whigs agreed with the northern Whigs, or National Republicans, only in their opposition to Jackson, and differed from them on the fundamental issues of the Bank, tariff and internal improvements. These Southern Whigs in 1836 nominated Hugh White of Tennessee for President and Tyler for Vice-President. Van Buren was elected President.

Earlier in the year Tyler refused to obey instructions from the Virginia legislature to vote in favor of Benton's famous "expunging resolution." Twenty years previously Tyler had gone on record as to the binding force of such instructions, but he now disregarded them, voted against the Benton resolution and then resigned from the Senate, February 29, 1836. In 1838 he sat in the Virginia legislature, and in 1839 he was again a candidate for the Senate. The contest was a deadlock, and was never decided, because other events intervened to take Tyler out of the race.

**The Presidential Election of 1840.** In the meantime the Van Buren administration had fallen upon evil times in consequence of the panic of 1837. This panic was attributed, at least in part with justice, to Jackson, Van Buren's old chief, and Van Buren had to reap the harvest. In the election of 1840 the opposition elements sunk their differences of policy, declined to adopt a platform, and nominated General William Henry Harrison, a popular hero. To catch the votes of discontented

Democrats, the Whigs nominated Tyler for Vice-President. The campaign was a continuous, almost hysterical, uproar, and, as John Fiske says, was marked by "a more liberal use of claptrap" than any other Presidential contest in our history. Harrison and Tyler were elected, receiving 234 electoral votes out of a total of 294.

## *The Administration of John Tyler*

The inauguration of Harrison and Tyler was scarcely over before Clay showed clearly that he regarded the election as a victory for himself and the political principles for which he stood. Tyler, on the other hand, claimed to see in it nothing more than a stinging rebuke to the "corrupt and tyrannical" party led by Jackson and Van Buren. When, therefore, President Harrison's death within one month made Tyler President the situation promptly showed possibilities of strife.

When Congress met on May 31, 1841, nearly two months after Harrison's death, the Whigs had a majority in both houses. In his opening message President Tyler reviewed the history of the Bank of the United States and other financial plans, and closed as follows:

> I shall be ready to concur with you in the adoption of such system as you may propose, reserving to myself the ultimate power of rejecting any measure which may, in my view of it, conflict with the Constitution or otherwise jeopard the prosperity of the country, a power which I could not part with, even if I would, but which I will not believe any act of yours will call into requisition.

Congress, however, chose to ignore this poorly-concealed threat, and after abolishing Van Buren's subtreasury system proposed to reëstablish the Bank of the United States. The President approved the former step, but vetoed the bill to reëstablish the Bank, for the reason, which he had often stated, that Congress had no right to establish a corporation whose headquarters or branches should operate in the states unless the states individually gave their consent. Even before the passage of the bill there were attempts by the Whig leaders to get some "private compromise" which Tyler would approve, but the President declined to heed these advances. After the veto of the bill, a new bill was drafted, in a form which it was said the President could approve. Efforts were made to bully the President to sign the second bill. Clay, for example, wanted to know why the President did not follow his precedent in 1836, when he resigned from the Senate, and now resign the Presidency if he had scruples which "again hindered him from obeying the will of the people."

Tyler, however, was unmoved, and on September 9, 1841, five days after the passage of the second bill, returned it to Congress with his veto message. On the 11th all the members of the Cabinet except Daniel Webster, Secretary of State, resigned. Webster seems to have been influenced by a double motive: first, he wanted to conclude the negotiations which soon led to the Webster-Ashburton Treaty (which see); and second, he was farsighted enough to see that Clay, his great rival, would receive all the benefit from a Whig victory over Tyler. The majority of the Whigs now refused to recognize Tyler as one of their party, but a handful—which became known as "the corporal's guard"—acknowledged his leadership.

The Democrats now came to Tyler's support, and the elections of 1842 gave them a majority of sixty-one in place of the former Whig majority of twenty-five. The popular sentiment, too, as the shadow of 1837 moved farther away, showed a reaction in favor of the President. So strong was this reaction that in 1844 the Whig platform did not even mention the Bank of the United States. In the meantime the Whigs, in 1842, attempted to pass a protective tariff bill, which provided for a distribution among the states of the surplus which these duties would create in the government Treasury. Tyler vetoed the bill, chiefly because of this clause. Then Congress passed the bill without the clause, and the President signed it. One other question, involving internal improvements, divided the Whigs and Tyler. In 1844 Congress passed two so-called river-and-harbor bills, one for the Eastern states and one for the Western. The former Tyler vetoed, but the latter he signed because the Mississippi River, whose improvement was the principal object of the bill, was a "great common highway for the commerce of the whole country."

**Boundary Problems and Annexation.** On the north and south the boundaries of the United States had not been satisfactorily determined. The Webster-Ashburton Treaty of 1842 finally ended one source of dispute with Great Britain, but the Oregon question was left for Tyler's successor to handle. A third problem, Texas, was settled in the closing days of Tyler's term.

# OUTLINE AND QUESTIONS ON JOHN TYLER

## Outline

**I. Early Years**

(1) Birth and parentage
(2) Education
(3) Law study
(4) Marriage

**II. Public Life**

(1) In Virginia legislature
  (a) Defense of Madison's policies
(2) In House of Representatives
  (a) Independence of thought and action
  (b) Attitude toward National Bank
  (c) Attitude toward extension of slavery
(3) As governor of Virginia
(4) In United States Senate
  (a) Attitude on important questions
  (b) Break with the administration
  (c) Split in Democratic party
(5) Nominated as Vice-President, but defeated
(6) Presidential campaign of 1840
  (a) Candidates
  (b) Issues
  (c) Character of campaign
  (d) Results—Harrison and Tyler elected

**III. Administration**

(1) Death of Harrison and elevation of Tyler to Presidency
(2) Warning to Congress
(3) Quarrel with Whigs
  (a) Causes
  (b) Results—resignation of Cabinet
(4) Legislation
  (a) Tariff of 1842
    1. Concession necessary
  (b) River-and-harbor bill
(5) Boundary question
  (a) Webster-Ashburton Treaty
(6) Texas questions
  (a) Opposition of northern Whigs to annexation
  (b) Treaty of 1844
  (c) Annexation
(7) Internal affairs
  (a) Construction of telegraph
  (b) Dorr's Rebellion
  (c) Patroon War
  (d) Mormon troubles
  (e) Bunker Hill Monument dedicated
  (f) Admission of Florida
  (g) Fremont's Colorado explorations
  (h) Brook Farm established

**IV. Relation to Confederacy**

(1) Convention for adjustment
  (a) Rejection by Congress of resolutions
(2) Secession of Virginia
(3) Tyler elected to Congress of Confederacy

## Questions

Show from Tyler's policy in the House of Representatives, in the Senate and in the Presidency that his dominant characteristic was independence.

How many "accidental Presidents" were there before Tyler? How many have there been since?

What was Tyler's attitude toward slavery? Why did he vote against the Missouri Compromise?

When did he stand alone in the Senate in his vote on an important question?

What did Tyler consider the "original sin against the Constitution," and why?

Characterize the campaign in which Tyler was elected to the Vice-Presidency.

In what light did he look upon his own election?

What was his "poorly concealed threat" against Congress, and how did that body receive it?

What great statesman suggested that Tyler resign the Presidency? What were the circumstances that made possible such a suggestion?

What do these words suggest: Brook Farm; Patroon system; Fremont; Dorr's Rebellion; Nauvoo?

Texas had won its independence from Mexico in 1836. The majority of its citizens were natives of the United States, and from a national standpoint the annexation of Texas was desirable in every way. The opposition to annexation came from the Northern Whigs, who succeeded in rejecting the annexation treaty which the administration negotiated with Texas in 1844. After the election of 1844, however, the opposition weakened, and a joint resolution of both Houses of Congress, providing for annexation, was signed by Tyler on March 3, 1845. On the next day Polk became President.

**Election of 1844.** Tyler and the Whigs parted company long before the election of 1844. At the same time, the division between the Democratic factions continued, with the result that neither Tyler nor Van Buren was strong enough to win the Democratic nomination. It went to James K. Polk. Another factional convention, however, nominated Tyler. He accepted the nomination, but later withdrew his name when the regular Democrats appealed to him in the interests of the party and formally urged him to return to the fold.

**Miscellaneous Items of Interest.** Two events of far-reaching importance took place during Tyler's term. One was the construction of the first successful telegraph line in 1844; the other was the discovery of copper in Michigan in the same year. Dorr's Rebellion (1842) in Rhode Island, the Patroon War in New York, the difficulties of the Mormons at Nauvoo, the dedication of Bunker Hill Monument (1843) and the admission of Florida to the Union (1845) are other important events which are discussed elsewhere in these volumes. Fremont's explorations in Colorado in 1842 to 1844; the establishment (1845) of the *True American,* an abolitionist journal, at Lexington, Kentucky; and the foundation of "Brook Farm" near Boston, must also be mentioned.

**Tyler and the Confederacy.** At the close of his term President Tyler retired to an estate which he bought three miles from Greenway, his birthplace. There he lived quietly until the threat of war called him to action in 1861. In a letter to the Richmond *Enquirer,* January 17, 1861, he recommended a convention of the border states to devise some adjustment for the difficulties caused by the secession of South Carolina. Such a convention was held at Washington in February, and Tyler was chosen as its president. When the Congress of the United States rejected the resolutions adopted by the convention, Tyler abandoned further efforts. The next day, in the Virginia state convention, he advocated immediate secession. In May, 1861, he was elected to the provisional Congress of the Confederacy, and in the autumn was elected to the permanent Congress. Before he had taken his seat, he died at Richmond, on January 18, 1862. He was buried in Hollywood Cemetery, Richmond, his grave being about thirty feet from that of James Monroe. The grave remained unmarked for more than half a century, but in 1914 Congress appropriated $10,000 to erect a suitable monument.

Consult Tyler's *Letters and Times of the Tylers.*

**TYLER,** Moses Coit (1835-1900), an American educator and writer on the history of literature. He was born at Griswold, Conn., studied at the University of Michigan and at Yale and after graduating at Andover Theological Seminary became a Congregational preacher at Oswego, N. Y. Later he removed to Poughkeepsie, but abandoned the ministry in 1862, because of ill health. For four years thereafter he lived in England, and on his return home in 1867 became professor of literature at the University of Michigan. In 1881 he accepted a professorship of American history at Cornell University, and that post he held until his death.

Very successful as a teacher, Tyler won a still more favorable reputation as a writer, and his greatest work, *A History of American Literature During the Colonial Time,* with its continuation, *A Literary History of the American Revolution,* ranks with the masterpieces on the subject. Charming in style and evidencing high scholarship, its only fault lies in the tendency of its author to regard too favorably certain unimportant writers—a fault into which his good nature and geniality betrayed him. His other writings include *Patrick Henry,* a standard biography; *Three Men of Letters* and *Glimpses of England.*

**TYLER,** Wat ( ? -1381), an English soldier and rebel, born in Colchester in the County of Essex, England, of obscure origin, who was selected as leader of what became known as Wat Tyler's Rebellion. At that time the condition of laborers in England was hard. They were oppressed and overtaxed; the further imposition of a poll tax on the overburdened people roused great discontent, and riots broke out. Tyler, as leader of an undisciplined mob, sacked the palace of the archbishop of Canterbury, beheaded three citizens and marched to-

wards London. Joined on the way by many discontented laborers, he reached the outskirts of the capital, and thousands of London apprentices, artisans and criminals swelled his ranks.

The king, Richard II, then a boy of fourteen, determined to ride out himself and meet the rebels. A long conference was held, in which Tyler demanded that serfdom be abolished. The king agreed, and retired to have the necessary charters drawn up. London was for two days given up to pillage and murder. Meeting the rebels again, the king listened to further demands from Tyler, who grew bold and insolent and was killed by Wolworth, mayor of London. The king showed great presence of mind and promised the rebels that he himself would be their leader. Meanwhile, troops having been brought up to support the king, the rebels were dispersed, about a hundred of the ringleaders being hanged. No permanent benefits were obtained, as the freedom granted by the king was revoked the next year.

**TYLER,** TEX., the county seat of Smith County, situated in the northeastern part of the state, 105 miles southeast of Dallas. Transportation is provided by the International & Great Northern and the Saint Louis Southwestern railroads. It is surrounded by a rich agricultural section, and ships cotton, corn, fruit, vegetables, hay and live stock. The leading industrial plants of the city are railroad shops and box, canning and ice factories. Tyler has Bellevue and Lakewood parks, Tyler College, Texas College (a Methodist school for colored students), a Federal building, city hall, Court of Criminal Appeals building and the Saint Louis Southwestern Railroad hospital. Settled about 1844, Tyler was incorporated in 1850. It has an area of nine square miles. In 1910 the population was 10,400; in 1916 it was 11,865 (Federal estimate).

**TYNDALE,** *tin'dal,* WILLIAM ( ? -1536), an English translator of the Bible, educated at Oxford and Cambridge, where he gave special attention to theology. Before the beginning of 1522 he accepted a position as tutor in a family of rank in Gloucestershire, and employed his leisure in preaching in the surrounding villages. His views so aroused the antagonism of the clergy that he was brought before the chancellor of the diocese. When allowed to depart, he determined to translate the New Testament into English, that it might enlighten the people. To one of his opponents he said, "If God spare my life, ere many years I will cause a boy that driveth the plough shall know more of the Scripture than thou dost."

In 1524 he visited Luther at Wittenberg, and then went on to Cologne, where he endeavored to have his translation printed. The work was discovered and the authorities of Cologne commanded the printers not to proceed with it, but in 1525 Tyndale succeeded in getting the New Testament printed at Worms and in smuggling copies into England. He wrote *The Obedience of a Christian Man and How Christian Rulers Ought to Govern,* and translated the *Pentateuch* and the book of *Jonah.* About 1529 Tyndale rejected Luther's doctrine of the actual physical presence of Christ in the Lord's Supper, and Calvin's theory of His spiritual presence in the bread and wine, and looked upon the sacrament as a commemorative act only.

Because Tyndale opposed the divorce of Henry VIII from Catharine of Aragon, Henry had him arrested and confined for sixteen months in the prison of the Low Countries near Brussels. In spite of strenuous efforts for his release he was tried for heresy, convicted and strangled, and his body was burned at the stake, August 6, 1536. Tyndale ranks among the most remarkable leaders of the Reformation, but his fame rests chiefly on his translation of the Bible.

**TYNDALL,** *tin'dal,* JOHN (1820-1893), an English natural philosopher and one of the world's greatest physicists, was born at Leighlin Bridge, Ireland. Chiefly a self-made man, he gained his early scientific experience in the Irish and English ordnance surveys and in railway engineering. After two years at the University of Marburg, Tyndall received his doctor's degree and rose rapidly to eminence. In 1853 the Royal Institution made him professor of natural philosophy, a colleague of Faraday, and appointed him director on the latter's death. As scientific adviser to Trinity House and the Board of Trade, he carried out many experiments directed toward practical ends.

JOHN TYNDALL

Tyndall yielded to the fascination of mountain climbing in Switzerland, and as a result

became engrossed in elaborating a theory for the flow of glaciers—a theory which brought him in direct conflict with other scientists. His chief scientific labors, however, are connected with a study of radiant heat, its transmission and radiation, and its absorption by vapors and gases. Other experiments with pure air led to improved methods of sterilization. In 1872-1873 he lectured in America, and generously donated the large proceeds of his tour to the cause of American science.

Great and permanent as are his scientific contributions, the personality of the man himself assures for him a surer and more permanent regard in the mind of posterity. First he observed and explored nature, and then set himself to expressing his knowledge in the most forceful, vivid manner possible. Though he earnestly pursued science for its own sake, he was equally bent on making it popular, on bringing it within the understanding of common men. His name, with those of Darwin and Huxley, is permanently connected with the endeavor to establish the new standpoint of science as a part of modern philosophy. His principal works include *Faraday as a Discoverer, Heat as a Mode of Motion, The Forms of Water, Lectures on Light, On Sound, Diamagnetism and Magno-crystallic Action, Contributions to Molecular Physics in the Domain of Radiant Heat, The Glaciers of the Alps, Hours of Exercise in the Alps,* and *Fragments of Science for Unscientific People.* M.R.T.

**TYPE,** a raised letter or character cast in metal or carved in wood, and used in printing. Printers once carved their own type from blocks of wood and later cast them in metal, but type founding is now an important industry, and printers buy their type. Newspapers and magazines are printed from type that is separately cast for each issue and at once melted down (see LINOTYPE). The type commonly found in printing establishments is a slender, rectangular block of metal ninety-two hundredths of an inch high, carrying a raised letter on its top, or face. A nick on one surface indicates how the type should be set; a groove along the bottom allows the type to stand on two feet and gives it more steadiness. In the figure, *f* is the face, *n* the nick, and *g* the groove.

FORM OF TYPE
Explanation appears in the text.

**Founding.** The first step in casting type is to shape a model of the letter desired. This model, or die, is of steel, and when it has been finished, the workman stamps it into soft copper, leaving an impress of the letter. This soft copper becomes then the mother type, or *matrix,* from which an indefinite number can be struck off. The matrix is placed in a mold having the shape and size of the finished type, and melted type metal is run in and allowed to harden, much as bullets were molded in pioneer days. The founding was, indeed, once done wholly by hand, but machines now in use make it possible to cast 140 or more pieces of type in a minute. The metal used is an alloy of lead and antimony, with a little copper and tin added. It hardens almost instantly. In the process of manufacture, from one-fourth to one-third of the letters are defective, and are destroyed.

A complete assortment of type of any given size is called a *font.* The weight of a font varies with the kind of printing to be done, and has a range of from about one pound to 500 pounds or more. The printer arranges his type for convenience into upper and lower cases. The upper case contains compartments for the capital letters, small capitals and signs, and in the lower case, the small letters, figures and spaces are kept. Some letters are used in writing much more frequently than others; *z,* for example, occurs much less frequently than *a* or *e,* and, accordingly, a font will contain many more *a's* and *e's* than *z's.*

**Size.** Thirteen sizes of type are in common use in printing books and newspapers, but the smaller of these sizes are relatively little used. The tendency in recent times has been to increase the size of the type used so as to avoid needless strain on the eye of the reader. The size of type is indicated either by a special name or by the number of *points* it measures, a point being one-seventy-second of an inch. Modern printers use the term *point* in describing type. Both methods of naming are shown in the following table:

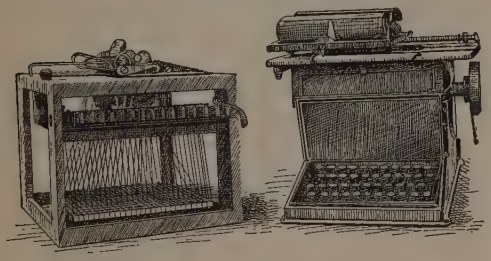
| | |
|---|---|
| Pearl | 5-point |
| Agate | 5½-point |
| Nonpareil | 6-point |
| Minion | 7-point |
| Brevier | 8-point |
| Bourgeois | 9-point |
| Long Primer | 10-point |
| Small Pica | 11-point |
| Pica | 12-point |
| English | 14-point |

A special kind of type, some of it as large as 96-point or even 144-point, is used by newspapers in setting the so-called "scare head" for news of an important or sensational character. Similar type is used in printing advertising posters. See PRINTING.

Consult De Vinne's *Historic Printing Types.*

**TYPE'SETTING MACHINE.** See LINOTYPE; MONOTYPE.

**TYPEWRITER,** *type'ri ter.* The modern typewriter is the outgrowth of various crude machines for producing printed characters on paper without the use of movable type. In the year 1874 the first really practicable machine was placed on the American market by E. Remington & Son, a firm engaged in the manufacture of guns, at Ilion, N. Y. The original model of this machine was designed by C. L. Sholes, S. W. Soule and Carlos Glidden of Milwaukee, Wis., but to Sholes is due the chief honor of perfecting a workable model. Once the typewriter had proved its value its future was assured, and to-day it is indispensable in the business world, in law courts, in government offices, in the military camp and in almost every field of activity. It has made possible the efficient handling of huge volumes of correspondence, the rapid tabulation of statistics, the methodical transcription of records and reports, and has facilitated the countless other operations carried on in the professional and business world. In this connection it is interesting to note the part the typewriter has played in bringing women into industrial life. Stenography and typewriting have opened the way into business to many thousands of women, and in numerous cases a knowledge of the art has been a stepping-stone to a high-salaried executive position.



THE FIRST TYPEWRITERS
At the right is the first Sholes machine, built in 1873. At the left, the machine made by Sholes, Soule and Glidden, in the following year.

The original Remington typewriter was not unlike the standard machines of to-day. It was provided with a number of metal bars, carrying type on one end, and set in pivots about a horizontal ring. The shorter arm of each type bar was attached by a wire to a lever, which ended in a letter in the keyboard of the machine. When the key was struck, the type was lifted so as to strike a single point on a rubber cylinder called the *platen.* Between the type and the platen an inked ribbon, wound on spools at either side of the machine, was carried. The platen, mounted on a carriage, was so arranged that it was automatically moved forward one space at each release of the keys. In machines of the present time, the type bars are usually arranged horizontally about an arc of a circle, making possible the so-called "visible" writing. In the old-style machine the characters when printed were out of view of the operator.

The first machines had two sets of type bars, one for capital letters and one for small letters. Nearly all modern machines have a single keyboard, and each type bar carries two characters. Capitals are made through the action of a shift key. The keyboard also carries punctuation marks, figures and various other characters. Other improvements are the bell to warn the operator when the end of the line is nearly reached, the lock to prevent the machine from working after a certain point is passed, the margin release, the back-space lever, the automatic ribbon reverse, and various mechanical devices for such operations as addressing, tabulating and the like. B.M.W.

**TYPHOID,** *ti'foid,* **FE'VER,** an infectious disease characterized by inflammation and ulceration of the intestinal walls. It is caused by a bacillus identified in 1880. During the course of an attack the germs multiply in other organs of the body, notably the kidneys and the spleen, and enlargement of the latter organ is of common occurrence.

**Distribution.** Persons contract typhoid fever by drinking contaminated water or milk and by eating infected food. The disease is not communicated through the breath of a patient, nor is it spread by touch. The bowel and kidney discharges of the sick, however, contain countless millions of disease germs, and if these are not properly disinfected or disposed of they become a source of great danger by infecting sewage and thus the water supply. House flies alighting on these discharges carry the germs into the home and contaminate the food. Infected milk is not due to the cow, for cattle never have typhoid, but the contamination results from the use of impure water to dilute milk, or from washing utensils in polluted

water, or through the handling of milk by unclean persons. There are also a few unfortunate persons known as "carriers," who are immune to attacks themselves but nevertheless are at all times carrying in the system disease germs which are a constant source of infection.

**Prevention.** Within recent years there has been a widespread educational campaign to teach people how to avoid the disease, and there has been a remarkable decline in the death rate and in the number of cases in many large cities. The New York City Department of Health issued the following directions in 1916. They should be followed by every individual:

Keep yourself in good health. Do not use alcoholic drinks. Keep your home and your body clean. Always wash your hands before eating. Drink only the best milk; if in doubt, boil it. Drink only pure water; if in doubt, boil it. Eat only pure, good food. Fresh-cooked food is safest; heat kills the germs. Avoid salads, raw vegetables and raw oysters, unless you know they come from a clean place. Wash ice when it comes and keep the icebox clean. Do not put ice in drinking water or on food. Deal only with good, clean food stores. Don't eat at dirty restaurants. Keep flies out of your rooms and away from your food. Be careful when you go to the country; be sure of what you eat and do not drink from a strange spring or stream. Never visit where there is a case of typhoid fever. Be careful about friends who have had typhoid fever; they may be carriers. Where there is an outbreak of typhoid fever use only boiled water for drinking, and also boil milk just before it is used. If typhoid fever is in your house or neighborhood, or you are exposed to the disease in any way, or are likely to be, have yourself immunized.

People are made immune by vaccination, which consists in three hypodermic injections of a prepared vaccine. Protection is believed to last about three years. That the belligerent armies in Europe were comparatively free from typhoid attacks during the War of the Nations was due to the universal application of this vaccine method. During the Boer War there were more than 20,000 cases among the British troops; from the beginning of the war in Europe up to 1917 there were fewer than 1,500 cases among the British forces in France and Belgium.

**Symptoms and Treatment.** It takes from eight days to two weeks for the fever to manifest itself after the germs have entered the system. The attack comes on gradually; early symptoms are rising temperature, nausea, diminished appetite, headache, pains in the back and limbs and bleeding at the nose. At the end of a week or so the patient has a temperature of from 103° to 105°, and an eruption of pink spots breaks out on the abdomen. The spots disappear in two or three days, but are followed by others. Cases sometimes end fatally at the end of the second week through hemorrhage (caused by ulcers eating into the blood vessels) or through perforation of the intestine. The fever begins to decline during the third week, but this is a period of grave danger, because the patient suffers from weakness, tremors of the muscles, delirium and weakening heart; at this time death may result from exhaustion. In most cases the patient begins to convalesce during the fourth week.

Treatment is mainly along hygienic and dietary lines. It is important that the fever be controlled, and this is done by means of sponging baths or the wet pack. Aside from antiseptics used in intestinal injections, few drugs are used. Liquid food and cool water are important items in the diet. To prevent the spread of the disease, all implements, utensils and clothing used about the patient must be thoroughly disinfected, and discharges must be either disinfected or burned. C.B.B.

Consult Hare's *Reference Handbook of the Medical Sciences;* Whipple's *Typhoid Fever: Its Causation, Transmission and Prevention.*

**TYPHOON,** *ti foon',* the local name for cyclonic storms which sweep over the Philippine and Japanese islands to the neighboring coast of China nearly every year during the months of August, September and October. They originate near the equator, when the Pacific doldrums are farthest north, and after moving towards the northwest turn northeast, often doing great damage in Japan. Storms of the same nature in the West Indies are called *hurricanes.*

**Related Subjects.** The following articles in these volumes will be of interest in connection with this discussion of the typhoon:

| | |
|---|---|
| Cyclone | Tornado |
| Doldrums | Whirlwind |
| Hurricane | Wind |
| Monsoon | |

**TYPHUS,** *ti'fus,* **FEVER,** a dangerous and highly contagious disease, occurring chiefly in slum districts, prisons and army camps and other places where overcrowding and lack of sanitation prevail. It is also known as *jail fever* and *spotted fever,* the latter name referring to a characteristic eruption appearing in the course of the disease. The germ which causes it was discovered in 1914 by Dr. Harry Plotz, of the Mount Sinai Hospital staff, New

York City. The disease is transmitted chiefly by the body louse, and sometimes by head vermin. An attack comes on suddenly, and is manifested by rise of temperature, severe nervous symptoms, rheumatic pains, headache and rigor of the muscles. About the fifth day of the attack slightly-raised spots appear on the body; at first these disappear when pressed, but later they become permanent and darker. During the second week the patient usually becomes delirious, and about the fourteenth day the attack reaches a crisis. In favorable cases recovery follows rapidly.

One of the worst epidemics of this disease known in modern times occurred in 1914-1915 in Serbia, when fully 135,000 persons died. Passenger steamers carried the disease to New York, and the quarantined cases gave Dr. Plotz opportunity for his investigation and discovery. An American commission to combat the disease in Serbia was organized under the auspices of the American Red Cross and the Rockefeller Foundation of New York, and through their efforts the epidemic was ended. Dr. Plotz prepared a vaccine that is being used with very good results among those exposed to typhus fever. The important preventive measure of vaccination has been responsible for keeping out epidemics of the disease among the armies of the belligerents in Europe.

Treatment of typhus victims is mainly along hygienic lines. Patients are isolated and are given clean surroundings, and their clothing is disinfected or sterilized. By this means lice and eggs are destroyed. Fever, headache and delirium are controlled by ice packs, baths, etc., and certain drugs are also administered which act as stimulants and laxatives. Typhus fever should not be confused with typhoid fever (which see). C.B.B.

**TYRE,** *tire,* a wealthy and powerful city of ancient Phoenicia, situated on the eastern shore of the Mediterranean Sea, fifty miles south of Beirut. Sidon, its rival in commercial and political importance, lies twenty-four miles to the northeast. The original city was built on a small island three-fourths of a mile from the mainland. When, in 332 B.C., Alexander the Great carried on a famous siege of the city, he constructed a causeway joining the island and the mainland, and this ancient structure, widened by deposits of sand, has transformed the island into a peninsula. The small town of Sur, built about a harbor at the north end, is the modern representative of old Tyre, which in the Roman period occupied both the island and a strip along the mainland.

Centuries before the birth of Christ Tyre was one of the greatest maritime cities of the world, and Tyrian colonists founded Gades (Cadiz), in Spain, and Carthage, in Northern Africa. The mother city in this period was widely known for its purple dyes and glassware. During the Roman period it was a center of learning and possessed a great university, and in later years it revived as an industrial center. The Crusaders captured it in 1124. Tyre remained under Christian domination until 1291, but in that year it was destroyed by the Moslems. The present town, which has about 6,500 inhabitants, dates from the eighteenth century. See PHOENICIA; SIDON.

**TYROL,** or **TIROL,** *tir'ol,* a crownland in Western Austria, noted for its magnificent scenery. Though this region has scarcely any lakes, in its physical features it bears a striking resemblance to Switzerland. Lofty ranges of the Alps extend along its frontiers and traverse it in various sections, and their towering peaks and picturesque valleys are unsurpassed in charm and variety of scene. In the north the country is crossed by the Inn, the principal river, and far to the south is the valley of the Adige.

Tyrol has an area of about 10,305 square miles, and at the outbreak of the War of the Nations it had a population of over 946,000. The majority of the inhabitants, who are chiefly of German and Italian birth, are Roman Catholics. For administrative and judicial purposes Tyrol is joined with Vorarlberg, Austria's most westerly and smallest crownland. Innsbruck (which see), the capital of Tyrol, is a university city of over 57,000 inhabitants. During the War of the Nations the crownland was invaded by Italian forces.

THE WORLD BOOK
ORGANIZED KNOWLEDGE IN STORY AND PICTURE
TRADE MARK REGISTERED

# Uu

**U** is the twenty-first letter of the English alphabet. There was no such letter in the Phoenician alphabet, but when the Greeks took up the system they added a letter which was called *upsilon* and was pronounced like the English *oo*. It was written at first either like a capital *V* or a capital *Y*, but gradually the latter came to be used almost exclusively by the Greeks, while the Romans used the *V*. The sound in Greek also changed by degrees to one that resembled the French *u*, and is more like a long *e* than like anything else in English; and the Romans took over the *Y* form to represent this new sound. The *V* in Latin had usually the vowel sound, but at the beginning of words it had a consonant force, like the English *W*, and in time the rounded form *U* came to represent the vowel sound, while the angular form stood for the consonant. In English, when the *V* sound was introduced, a new letter was necessary, and *W* was added.

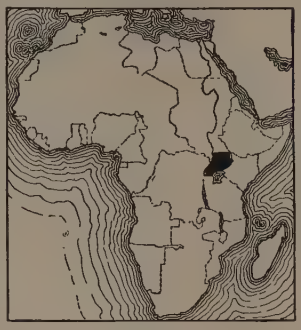
In most modern languages long *u* has the *oo* sound, but in English this is preceded by a distinct *y* sound—*yoo*, as in *use*. This is much more pronounced after some consonants, as *k, p, b, m, f*, than after others, and in the case of *r* the *y* sound practically disappears, *rule* commonly being pronounced as *rool*. A short *oo* sound appears in such words as *pull;* the regular short *u* sound in *but*, and the so-called circumflex sound in *burn*. Occasionally *u* has the sound of short *i*, as in *busy*, or a short *e* sound, as in *bury*. It is always used after *q*, where it has the force of a *w*, and in some words is silent, serving merely to give the hard sound to the consonant which precedes it, as in *plague*.

**UDALL,** *u'dal,* NICHOLAS (1506-1556), an English schoolmaster and playwright, whom it is essential to remember chiefly as the author of the earliest English comedy, *Ralph Roister Doister*. He was born in Hampshire, studied at Corpus Christi College, Oxford, was head master of Eton from 1534 until 1541, and head master at Westminster School about 1554-1556. For a time he maintained himself by making translations into English—chiefly from the Latin—such as the works of Terence and the *Apophthegms* of Erasmus. However, his fame for posterity rests chiefly upon *Ralph Roister Doister*. It was published in 1566, but must have been written considerably earlier; the exact date has not been determined. The chief and title character of the comedy resembles the *Miles Gloriosus* of Plautus—the boasting soldier finally shown up as a coward. The humor is original and spontaneous, and the play is interesting in itself, aside from its historical interest as the first English comedy.

**UFFIZI,** *oo feet'se,* **PALACE,** a famous building in Florence, noted for its wonderful gallery of painting and sculpture. Originally it was a government office of the grand dukes of Tuscany, and in it was housed a part of the art collection of the Medici family (see MEDICI). In 1737 this collection was given to the state. It is one of the most extensive and valuable in the world, containing the famous statue of *Niobe*, the *Boy Drawing Out a Thorn*, the *Venus de' Medici*, and other pieces of ancient statuary, as well as splendid examples of all the great Italian artists and many of other nationalities. The Pitti Palace, which contains another famous collection, is connected with the Uffizi by a passageway.

**UGANDA,** *oo gahn'dah,* a British protectorate in the eastern part of Africa (see PROTECTORATE). It is a political division of British East Africa, and consists of the native kingdom of Uganda and several adjacent states, the total area being 109,119 square miles, about equal to

that of Nevada. Of this area, 16,377 square miles are water, for within the boundaries of the protectorate lie portions of Victoria Nyanza, Lake Albert, Lake Edward and Lake Rudolph, and all of lakes George, Kioga and Salisbury. Except in the vicinity of Lake Rudolf, the soil is generally fertile and produces a variety of tropical products. Cotton is the principal crop, and the annual yield is steadily increasing. Other products of commercial value are ground nuts, coffee, ivory, rubber, hides and skins, and experiments are being made in the production of arrowroot, cocoa, tea, wheat and tobacco. In normal years Uganda carries on an active trade with Great Britain, the United States, British India and the Belgian Congo. The chief exports include goatskins, hides, coffee and cotton.



LOCATION MAP

Entebbe is the British headquarters and seat of government, but Mengo is the native capital. Native kings and chiefs are permitted to conduct the government of their own subjects. The protectorate has the advantage of steamboat, railway and telegraph service. In 1915 the population was estimated to be 2,927,494. The majority of the inhabitants are natives, and of these about 600,000 belong to the Baganda race, an intelligent people who have responded to the efforts of missionaries and are now almost all Christian.

**UHLAND,** *oo'lahnt,* JOHANN LUDWIG (1787-1862), a poet and philologist, born at Tübingen, Germany. He studied law in the university of that city, and practiced the profession for a time at Stuttgart, Germany, but the fascination of the study of languages and literature was so great that he gradually gave up his work as a lawyer. He had begun to write poetry at the age of thirteen, and by his twenty-eighth year had gained fame through his fervid, patriotic songs and ballads. His *Fatherland Poems* were so enthusiastically received that the grateful citizens of Württemberg elected him to their provincial assembly, where he showed marked political ability.

From 1829 to 1833 he was professor of German literature at the University of Tübingen, and again displayed his many-sided genius by profound studies in mythology and philology. After 1850 he retired from all public activities and gave the last twelve years of his life to study and writing. As a writer of songs and ballads he ranks with the greatest of all time. He caught the simplicity and spirit of the old folk songs which he had studied so lovingly, and wrote similar ones which charmed not only Germany but all other European countries and America.

**UHLANS,** *oo'lahnz,* a name given to certain bodies of mounted lancers, especially in Eastern Europe. In the countries where they were originally known, the Uhlans were accustomed to wear a sort of semi-Oriental costume with loose, flowing sleeves and baggy trousers. In addition to the lance, they carried a curved scimitar. A corps of Uhlans was temporarily established in the French army under Marshal Saxe. The term has been made familiar to Western peoples since the outbreak of the War of the Nations by the prowess of the Prussian light cavalry troops, who bear the name. They have long been among the best cavalry in the world. They carry spears in addition to more modern arms. See CAVALRY.

**UINTA,** or **UINTAH,** *u in'ta,* **MOUNTAINS,** a lofty range of the Rocky Mountains system, jutting out at right angles to the Wasatch Mountains and covering a large part of Northeastern Utah. The Green River has cut a tremendous gorge across the range, disclosing some of the coal-bearing rocks which underlie the surface. Gilbert Peak, rising 13,687 feet above sea level, which is the highest point in the state, is in this range; others are Emmons Peak (13,624 feet) and Wilson Peak (13,300 feet). See UTAH.

**UKRAINE,** *u'krayn.* When the Russian bolsheviki government (see page 6165) early in 1918 declared for "self-determination of peoples" the people of the Russian Black Sea provinces, in the region known as the Ukraine, declared their independence and proclaimed the Ukraine republic, with Kiev as the capital. The word Ukraine means *borderland.*

The area of this new country is about as great as that of Ohio, Indiana, Illinois, Wisconsin and Michigan, but Ukraine, in the world crisis of that year, meant something more than size. It occupies the best part of the famed Black Earth Belt, the "granary of Russia" (see page 5117). The new republic met reverses at the outset, for German armies, ignoring peace terms and the wishes of the Ukrainians, took measures to

assure dominance in the country and control of the food supply, so sorely needed in Germany. The Ukraine legislative body was forcibly dissolved, and German dictatorship was substituted, in May, 1918.

The Ukrainians have long cherished hopes of independence, but under the old Russian Empire every attempt in that direction was crushed by the czar. They are a Slavic people, number about 35,000,000, and belong to the Greek Church.

**ULTRAMARINE,** *ul tra ma reen',* a blue pigment formerly ground from the lapis lazuli, a rare stone. It is valued by painters because of its brilliancy of tone and durability of color, for oil as well as water-color painting. The process of extracting the blue pigment from lapis lazuli, which was practiced as early as the eleventh century, consisted in grinding the stone, reducing it to a powder by heat, and again grinding it in a mill or with a porphyry slab. This was an expensive procedure, for the lapis lazuli is rare, and the yield amounted only to two or three per cent of the mineral used. The old masters were accustomed to utilize the residue of the lapis lazuli, after the chief color had been extracted, as a neutral tint for skies and draperies. Now artificial means are employed in the manufacture of ultramarine, with satisfactory results. By one method, sodium sulphate, china clay and carbon are ground and the mixture is heated in crucibles, after which it is roasted with powdered sulphur. See Lapis Lazuli.

**ULYSSES,** *u lis' eez,* in Greek mythology, the king of Ithaca and the most famous of the Greeks in the Trojan War. He was one of the suitors of Helen, and proposed the compact which bound the Greeks to support the husband of Helen, whoever he might be. When he found that he could not be successful in his suit for Helen, he married Penelope, the daughter of Icarus, with whom he was very happy. Then he returned to Ithaca, received the crown from his father, and began to enjoy life in ease and quiet.

When Helen was abducted by Paris, he knew that he would be called upon to fulfil his part of the compact, and desiring to remain at home with his wife, he pretended to be insane and spent his time plowing the seashore with a horse and a bull yoked together, and in sowing the shore with salt. But Palamedes suspected the fraud. He put little Telemachus, Ulysses' son, in the furrow, and when Ulysses turned the plow aside to save his child, Palamedes was confirmed in his opinion, that the insanity was pretended. He urged upon Ulysses the binding force of his vow, and Ulysses accordingly went to the war.

Throughout the Trojan War he distinguished himself not only by his great valor but by the wisdom of his counsel and the keenness of his insight into Trojan methods. He fought with Ajax, and won the glorious armor of Achilles. He stole into Troy and assisted Diomedes in carrying away the Palladium, though in that expedition he did not figure very honorably; and it was he who proposed the building of the Wooden Horse. After the fall of Troy, like most of the Greek chieftains, he suffered many hardships and wandered in many lands, where he had marvelous adventures which formed the subject of Homer's famous *Odyssey.*

On his return, he found his wife faithful to him, though besieged by many suitors. She had persistently put them off by many stratagems, and finally declared that she would accept no one who could not bend the massive bow which her husband had left with her. At this time Ulysses, who had been absent for twenty years, appeared on the scene disguised as a beggar and known only to his son Telemachus and a faithful herdsman. In this guise he entered the room where the suitors were striving to shoot with his own mighty bow. When he asked permission to try his skill, the youths laughed at him, but Telemachus persuaded his mother to let the old man try. To the astonishment of all, Ulysses easily bent the bow and shot the arrow through the twelve rings which she had pointed out. He quickly made himself known, then turning toward the handsomest and most treacherous of the suitors, he shot him through the heart, and by the aid of his son and Minerva slew all the other wooers. For a time Ulysses lived happily in the quiet and peace of his old home. But again the wandering spirit came upon him, and he equipped a fleet and sailed "out into the west" on an expedition from which he never returned. The Greeks believed that he had found the Isles of the Blest, and there dwelt in perfect peace with other heroes. A.MC C.

**Related Subjects.** The following articles in these volumes will explain the references in the above discussion of Ulysses and give added information:

Achilles
Ajax
Calypso
Circe
Cyclopes
Helen of Troy
Lotus, subhead *The Lotus-Eaters*
Odyssey
Palladium

| | |
|---|---|
| Paris | Sirens |
| Penelope | Troy, subtitle *Trojan War* |
| Polyphemus | Wooden Horse |
| Scylla and Charybdis | |

**UMBELLIFERAE,** *um be lif' ur ee,* the botanical name for the parsley family. The word is from the same root as the word *umbrella,* and is applied because most members of the family have flowers arranged in umbrellalike clusters. There are from 1,500 to 2,000 herbs and shrubs in this family, and while they are to be found in all parts of the world, they are most abundant in the north temperate zone. Some of the species are poisonous, others have medicinal value, and others are useful food plants. Representatives of the latter group are carrots, celery and parsnips. Anise and caraway, which are cultivated for their seeds, and fennel and parsley, cultivated for their leaves, are other members of the family.

**Related Subjects.** For a discussion of the most important members of the family of umbelliferae, the reader may consult the following articles in these volumes:

| | |
|---|---|
| Anise | Cow Parsnip |
| Caraway | Fennel |
| Carrot | Hemlock |
| Celery | Parsley |
| Cicely | Parsnip |

**UM'BER,** a soft, earthy mineral pigment, used in the preparation of oil and water-color paints. *Raw umber,* obtained by grinding the mineral to a powder, is the source of a brown paint. *Burnt umber* has a richer, deeper color. The name has reference to the fact that the pigment was first found in Umbria, Italy. It is now mined in Illinois, Pennsylvania, New York and Georgia, on the island of Cyprus, and in small quantities in various places on the European continent.

**UMBRELLA.** Though to-day this term is used almost exclusively to mean a protector against the rain, while a sunshade is called a *parasol,* the umbrella was originally a sunshade, and the name is from a Latin word meaning *little shadow.* These protectors had their origin in Oriental countries, where the sun was hot and bright; the sculptures of ancient Egypt and Assyria show slaves bearing umbrellas over the heads of their kings. Even to-day in those same countries the umbrella is to some extent regarded as a symbol of rank.

**UMBREL'LA BIRD,** a bird of tropical South America, whose most conspicuous ornament is a high, rounded crest of long, slender feathers that droop forward, unbrellalike, over the end of the bill. It also has a beautiful plume of glossy black feathers hanging from its throat before its breast. The bird is about the size of a crow, and, like it, is colored black. Its food

UMBRELLA BIRD

is mainly fruit. Its four white eggs are placed on a platform of sticks in the top of a high tree.

**UNALASKA,** *oo na las' ka,* the most important of the Aleutian Islands, is situated 135 miles southwest of the mainland of Alaska, to which territory it is politically attached. The island has a length of seventy-five miles and a breadth of from ten to twenty-five miles. It is mountainous, of volcanic formation, the peak of Makushin rising 5,691 feet above sea level.

The largest settlement or village is Unalaska, with a population of 450; its trade is steadily increasing on account of the Alaskan gold fields, and because it is a port of call for all vessels navigating Bering Sea. A few Russians and Americans engaged in fishing live on the island, the natives being Aleuts.

**UNCAS,** *un' kahz* ( ? -about 1683), an American Indian chief, born in Connecticut. He was one of the chiefs of the Pequot tribe, but in 1635 rebelled against the head chief and formed a tribe of his own known as the Mohicans. Thereafter his life had to be one of constant watchfulness and strife. In 1637 he joined the English in a war against the Pequots; in 1643 he defeated the Narragansetts, and in 1648 had a desperate campaign with the Mohawks, Pocomtocks, Narragansetts and other tribes. The Narragansetts again attacked him in 1657; he was saved only by the intervention of a colonist, Ensign Leffingwell, and in gratitude he gave this Englishman the site of Norwich, Conn. He aided the New England

settlers in practically every Indian war between 1635 and 1680, and for this was so bitterly hated by the redmen that numerous attempts were made to assassinate him. A monument to his memory stands at Norwich. Cooper's *Last of the Mohicans* takes its name from another Uncas, one of his descendants.

**Related Subjects.** The reader may consult in this connection the following articles in these volumes:

| | |
|---|---|
| Mohawk | Narragansett |
| Mohican | Pequot |

**UNCTION,** *ungk'shun,* or **EXTREME UNCTION,** a sacrament administered in the Roman Catholic Church to a person in danger of death from sickness or from accident. It is not administered to those under sentence of death nor to those about to undergo surgical operations, nor to children who have not reached the age of reason. The sacrament is in accordance with the words of Saint James (*James* V, 14): "Is any sick among you? let him call in the priests of the church; and let them pray over him, anointing him with oil in the name of the Lord." Olive oil previously blessed by the bishop is used in anointing each organ of sense, and a prayer is offered for forgiveness of sins committed by that sense.

**UNDERGROUND RAILROAD,** the popular name given to the secret means employed by Northerners in assisting negro slaves to escape from the slave states before the War of Secession. Fully 25,000 negroes were given aid in obtaining their freedom during twenty-five years. Homes of the Northern sympathizers were used as hiding places or stations along the routes taken by the escaping slaves. They were given food and rest and were passed from one of these points to the next until Canada, the goal of freedom, was reached. The most common "underground railroads" were through Ohio and Pennsylvania. Gerrit Smith, Theodore Parker and Levi Coffin were the foremost promoters of the scheme. A graphic description of some of the methods employed is found in Mrs. Stowe's *Uncle Tom's Cabin.*

**UNDERGROUND RAILWAY,** a name formerly applied to the subways of great cities. See SUBWAY.

**UN'DERWOOD,** OSCAR W. (1862- ), an American statesman, long prominent in Democratic politics. He became a figure of national interest during the first administration of President Woodrow Wilson, when, as leader of the majority in the lower House, and chairman of the Ways and Means Committee, he took charge of the tariff legislation of 1913. In 1914, while still an active figure in the House of Representatives, he won the nomination for a United States Senatorship (for the term 1915-1921) in the Alabama primaries, easily defeating his opponent, Richmond P. Hobson (which see), in a spectacular campaign.

OSCAR W. UNDERWOOD

Underwood is a native of Louisville, Ky., and received his first schooling in that city. Later he studied at the University of Virginia, completed a course in law, and began to practice in Birmingham, Ala., in 1884. He was soon taking an active part in local politics, and in 1895 was elected to the Fifty-fourth Congress, representing his state in the lower House until his election to the Senate. His ability as a legislator and student of economics was brought out forcibly in his work for the passage of the tariff bill that bears his name.

**UNGAVA,** *ung gah'va,* a former large district of Canada, but since 1912 a part of the Province of Quebec. It comprised all the peninsula of Labrador, with the exception of a narrow strip on the eastern coast, and had an area of 456,000 square miles. The surface of Ungava is an undulatory plain, a maze of small streams and lakes, nearly one-third of the area being water. The population consists almost entirely of roving bands of Indians who live by trapping and fishing. The climate is rigorous, and the winter very long, often with a temperature of 60° below zero. For further detail, see QUEBEC.

The Department of Colonization of the Province of Quebec (address, Quebec) issued in 1915 *Reports on Ungava, Recently Added to the Province of Quebec, under the Name of New Quebec.*

**UNGULATES,** *ung'gu lates,* from a Latin word, *ungula,* meaning *hoof,* or *claw,* is the name applied to animals which have the last joint of the toes encased in a hoof, or a hoof-like nail. As a rule ungulates are useful to man. Zebras, elephants, the hippopotamus and deer are all wild ungulates, and horses, sheep, goats, cattle and pigs are domestic animals of the order. They are further divided into *odd-toed* ungulates, such as the horse, which is one-toed,

and the rhinoceros, which has three; and the *even-toed,* such as the pig, with four toes, and cattle and deer, with two. Ungulates are the only horned mammals.

**Related Subjects.** To the student who wishes to make a rather thorough study of the animals of this class, the following list will be most helpful:

| | |
|---|---|
| Addax | Hog |
| Alpaca | Horse |
| Antelope | Ibex |
| Ass | Koodoo |
| Babirussa | Llama |
| Bighorn | Moose |
| Boar | Mule |
| Buffalo | Musk Deer |
| Camel | Musk Ox |
| Carabao | Okapi |
| Caribou | Peccary |
| Cashmere Goat | Pronghorn |
| Cattle | Reindeer |
| Chamois | Rhinoceros |
| Cow | Rocky Mountain White Goat |
| Deer | Roebuck |
| Dromedary | Sheep |
| Eland | Springbok |
| Elephant | Stag |
| Elk | Steinbok |
| Gaur | Tapir |
| Gazelle | Vicuna |
| Giraffe | Wapiti |
| Gnu | Wart Hog |
| Goat | Yak |
| Guanaco | Zebra |
| Hartebeest | Zebu |
| Hippopotamus | |

**UNICORN,** *u'ni kawrn.* In the writings of the ancient Greeks and Romans, the unicorn was a curious animal of the size and form of a horse, which had on its forehead a single, straight horn, white at its base, black in the middle and red at the tip. The body of the animal was white, its head red and its eyes blue. No horse could overtake it. The word appears in the Bible, but it is considered there a mistake in translation for "wild ox," which has been substituted in some places in the Revised Version.

THE UNICORN
Used an an heraldic design on the British coat of arms.

**U'NIFORMS AND INSIG'NIA.** Uniforms are the distinctive dress worn by soldiers, by members of various secret and other orders, and by such public servants as firemen, policemen and railway conductors. The costume of the professional nurse is also called a uniform. Insignia are badges of office or distinction or of rank. The much-coveted star of the French Legion of Honor and the Iron Cross of Germany are typical insignia. In the modern world, both uniforms and insignia are associated chiefly with military service. Insignia, in particular, need to be exceedingly numerous to distinguish the arms, divisions and ranks in huge masses of armed men, where order can be obtained only by delegating authority through many grades and making each officer answerable for the conduct of his men.

The changed conditions of present-day warfare are reflected nowhere more strikingly than in the uniforms worn by the great armies of the world. When Shakespeare made Othello speak so feelingly of the "pride, pomp and circumstance of glorious war," he was not indulging in childish bombast but was describing the actual conditions he saw about him. For years the nations of Europe vied with one another in clothing their soldiers in the most splendid and gorgeous of hues. The fine regiments of the English home guard, in their dress uniforms, are among the shows of London streets. The uniforms are scarlet, blue and green, with facings of yellow, primrose and black, and yards of gold lace. Plumed busbies or gleaming helmets, with lustrous jackboots, add to the splendor of the effect. Scarcely less splendid and colorful are the parade costumes worn by German and Austrian regiments; while the voluminous scarlet trousers worn until recently by the French are famous throughout the world.

However smart such costumes may appear in time of peace, and however much they may aid the recruiting sergeant by increasing the spell of military service, they are disadvantageous in war. A modern commander would be inclined to regard the noble bravado that prompted Nelson to go into action with all his medals on his breast, thus making of himself a mark for sharpshooters, as folly. Concealment, not conspicuous display, is what protects the soldier in the field, and of late years military service uniforms have become neutral in tint, olive-drab, greenish-gray and other hues which tend to melt into the landscape. Such uniforms serve the same purpose as the protective coloring of certain animals; they help to render the wearer invisible.

The English have worn, since the Boer War, a service dress of khaki serge. The jacket is of

the shooting-coat pattern; breeches or trousers and puttees of the same stuff and color are worn. Khaki has also been adopted by the United States army for service dress; a cap of the same material and color is worn. The full-dress uniform of the officers is a dark blue, double-breasted coat with a thick gold shoulder cord and (for general officers) a velvet collar. The trousers are light blue with white stripes, and the cap is of blue cloth with a gold-edged band and an eagle badge. The German army was equipped with khaki-colored uniforms for field wear in 1904, and it was supposed that this uniform had been retained, until the War of the Nations revealed the fact that a new greenish-gray color had been substituted. It assisted at concealment still better than the khaki uniforms, and was generally regarded as the most practical service costume of the war.

**United States Military Insignia.** All officers, without distinction of rank, wear the letters *U. S.*, in Gothic design, at the collar. Further devices worn on the collar, on epaulets and shoulder knots indicate the branch, the department and the rank.

*Branch and Line Badges.* The general staff wear the United States coat of arms of gold and enamel on a silver star. The department of the adjutant-general is marked by a shield; inspector-general, crossed sword and fasces with wreath; quartermaster-general, sword and key crossed on a wheel and surmounted by a spread eagle; medical department, a caduceus; engineers, a silver castle; signal corps, two crossed signal flags and a torch in gold and silver. Infantry officers wear two crossed rifles with the number of their regiment above the intersection; cavalry officers, two crossed sabers; artillery officers, two crossed guns.

*Rank.* On the shoulder straps the brigadier-general wears one star and the major-general two stars. On shoulder knot and shoulder loop, the general wears a coat of arms between two stars; lieutenant-general, one large star between two small stars; major-general, two silver stars; brigadier-general, one silver star; colonel, a silver eagle; lieutenant-colonel, a silver leaf; captain, two silver bars; first lieutenant, one silver bar. The rank of noncommissioned officers is indicated by chevrons on the coat.

*The Navy.* Naval uniforms are similar throughout the world, and those worn in the United States navy may be regarded as typical. There are three uniforms—dress, undress and service. The ceremonial uniform consists of a double-breasted blue broadcloth coat with a high collar and gilt buttons; blue trousers with a strip of gold lace along the seam; epaulets, cocked hat and sword. The service unit includes a blue or white blouse, trimmed with braid. White uniforms are worn during the hot season and in the tropics.

Officers and cadets wear on the cap a silver shield, surmounted by a spread eagle, the whole mounted on two gold anchors crossed. Rank is indicated, as in the army, by a special emblem on collar, epaulet and shoulder straps. An admiral wears on his sleeve two strips of two-inch gold lace with a strip of one-inch lace between; rear-admiral, one strip of half-inch gold lace above a strip of two-inch lace; captain, four strips of half-inch gold lace; commander, three strips; lieutenant-commander, two strips of half-inch gold lace with a strip of quarter-inch lace between; lieutenant, two strips of half-inch lace; lieutenant (junior grade), one strip of half-inch lace, with one strip of quarter-inch lace above; ensign, one strip of half-inch gold lace; cadet, one strip of quarter-inch lace. G.B.D.

For distinguishing marks which denote officers' rank and for collar devices showing the departments of army service in the United States, see WAR OF THE NATIONS.

**UNION,** ACT OF, an act of the British Parliament to unite Upper and Lower Canada. The Quebec Act had provided a single province of Canada, but in 1791 this was divided by the Constitutional Act into two provinces, Upper and Lower Canada. The chief reason for the division was the influx of the United Empire Loyalists (which see) into Upper Canada. The desire of these Loyalists for English institutions was gratified by the separation, but half a century later the Union Act met with general approval.

The Union Act was the direct result of the Earl of Durham's report (see DURHAM, JOHN GEORGE LAMBTON). As the legislature of both Upper and Lower Canada favored the plan, the British Parliament in 1840 passed the Union Act, which went into effect in 1841. It provided for a legislative council of not more than twenty members, appointed by the Crown, and for a legislative assembly in which each province should be represented by eighty-four members. This equality in representation was afterwards one of the principal arguments against the Union and in favor of Confederation. In the records of the council and the assembly, English was the only official language. The legislature was to meet at least once a year, and

each assembly was to have an existence of four years, unless dissolved by the governor.

The task of arranging the details of the change fell to Mr. Poulett Thomson, who was rewarded by elevation to the peerage as Baron Sydenham and Toronto. The government under the Union Act, however, was never entirely satisfactory, even at its best, and after 1860 became steadily worse. The Union came to an end in 1867, when the Dominion of Canada was organized. See BRITISH NORTH AMERICA ACT.

**UNION OF SOUTH AFRICA,** a British colony famous throughout the world for the richness of its mineral deposits. More gold and diamonds are taken from it each year than from any other section of the earth. The Union, which occupies the extreme southern part of the continent of Africa, was constituted by an act of Parliament in 1909. This provided for the legislative union of the four provinces of the Cape of Good Hope, Natal, the Orange Free State and the Transvaal, and allowed each to retain its self-governing functions.

LOCATION MAP

The union has an area of 473,954 square miles—almost four times that of England, Scotland, Ireland and Wales combined. It consists in large part of vast, undulating plains, barren or sparsely covered with brushwood, and lofty, almost treeless, plateaus. The plain, or *veldt,* affords pasturage for millions of sheep. Ostrich farms are numerous, and ostrich feathers form one of the chief articles of export. Agriculture is, on the whole, rather backward throughout the Union, partly because of scanty rainfall over wide areas of the lofty veldt. The land, however, is quite fertile, and maize, wheat, barley and oats are grown, in addition to such tropical products as sugar, coffee, tea, cotton and tobacco.

**Mineral Deposits.** During the year 1914, the mines of the Transvaal alone supplied commerce and industry with gold valued at over $160,000,000, of which almost the whole came from the great Witwatersrand mines. The total gold supply of the world for that year amounted to only a little over $472,435,000. Less rich than the Transvaal in gold, the Cape province exceeds it in the weight and value of its diamonds. Some of the huge fortunes of the modern world have been dug out of Kaffir mines. During 1914 the output of the diamond mines was valued at more than $50,000,000, and the total value of the stones taken from the mines had reached over $1,150,000,000. See DIAMOND.

**The People and the Government.** The population of the union was 5,973,394 in 1911, about a fifth being white and of British or Dutch stock. The native peoples include the Bantus, Hottentots and Bushmen, with a considerable proportion of mixed stock having white blood. The government is conducted by a Governor-General, an Executive Council and a Parliament of two chambers. The Governor-General is appointed by the Crown, and he surrounds himself with an Executive Council of his own selection. The legislative function is discharged by a Senate of forty members (eight appointive and thirty-two elective) and an elective House of Assembly having 121 members. This Union Parliament recognizes no superior authority save that of the British Parliament in London.

**Cities and Transportation.** Johannesburg is the largest city of the union, with a population (1911) of 237,104. The railroad line connecting it with Cape Town dates from the finding of the wonderful gold fields on the Witwatersrand. After the discovery of diamonds, a railroad was built between Kimberley and Cape Town. Cape Town, with a population of 161,579 in 1911, is the second largest city and is the seat of the legislature. Pretoria (57,674) is the seat of the Union government.

**History.** The early history of these united colonies is a tale of the struggle of the whites with the native population and of the English with the Dutch colonists. The struggle between the English and the Dutch, or Boer peoples, culminated in the South African War, which assured British ascendency. A number of recent clashes between the natives and the white population have occurred. A still more serious conflict threatened soon after the beginning of the War of the Nations. A faction of the union, including a portion of the military force, rebelled and went over to the German side. Martial law was proclaimed, and General Botha defeated Generals de Wet and Beyers and suppressed the revolt. G.B.D.

Consult Brand's *Union of South Africa;* Colvin's *South Africa.*

**Related Subjects.** In connection with this description of the Union of South Africa, the

reader may consult the following articles in these volumes:

| | |
|---|---|
| Boer | Kimberley |
| Botha, Louis | Natal |
| Cape of Good Hope | Orange Free State |
| Cape-to-Cairo Railway | Pretoria |
| Cape Town | South African War |
| Diamond | Transvaal |
| Gold | War of the Nations |
| Johannesburg | |

**UNIONTOWN,** PA., the county seat of Fayette County, is situated in the southwest corner of the state, seventy miles southeast of Pittsburgh. It is served by the Pennsylvania and the Baltimore & Ohio railroads and by interurban lines. Uniontown is industrially important for its large output of coke; there are more than 5,000 men employed in the coke ovens of the vicinity. Near by are deposits of iron ore, glass sand and natural gas. The industrial establishments of the city include iron, steel and glass factories, foundries and machine shops. Here are located the county courthouse and jail and the county home for the poor. Beesontown, the original settlement, named in honor of its founders, was settled in 1767. The place was incorporated as the borough of Uniontown in 1796, and in 1915 it received a city charter. The population in 1910 was 13,344; in 1916 it was 20,780 (Federal estimate).

**U'NIT.** In measurement a unit is a quantity adopted as the standard by which any other quantity of the same kind is measured. The standard units of measure employed in science, commerce and industry have been tabulated in groups called tables of denominate numbers. There are units of money, of time, of surface measurement, of weight, etc. For the full explanation of those used in the English system, together with tables, see the article DENOMINATE NUMBERS. The units employed in the metric system are discussed under the heading METRIC SYSTEM.

**Centimeter-Gram-Second System.** This system, known as the C.G.S. system, is used in physics for convenience, as the meter is too long for many calculations. The unit of length is the *centimeter,* the unit of mass is the *gram,* and the unit of time, the *second.* The unit of area is the *square centimeter,* and the unit of volume is the *cubic centimeter.* The unit of force is the *dyne,* which is the force sufficient to move a body weighing a gram one centimeter a second. The corresponding unit of work is an *erg.* See DYNE; CENTIMETER.

**In Electricity.** In electrical calculations the unit of resistance is the *ohm.* The unit of force is the *volt,* which is the force required to maintain a current of one *ampere* through a resistance of one ohm. The *joule,* which is the practical unit of work, equals 10,000,000 ergs, and the *watt* is the corresponding unit of power. The *kilowatt,* which is 1,000 watts, is a more convenient unit in practice. See AMPERE; WATT; VOLT.

**Thermal Unit.** The quantity of heat required to raise the temperature of a pound of pure water one degree is known as the *thermal unit;* in the metric system it is called a *calorie.* See CALORIE.

**Related Subjects.** For quicker reference to the different standards, related subjects in the article are referred to by groups. The reader may follow the references through each group.

**UNITARIANS,** *u ni ta'ri anz,* a religious body which rejects the doctrine of the Trinity. The members of this sect believe that Christ was divinely appointed to teach, but that He should be followed rather than worshiped. In 1785, King's Chapel, in Boston, omitted from its Book of Prayer all mention of the Trinity and the deity of Christ. The idea spread throughout New England and the Eastern states, largely as an intellectual revolt from the rigid teachings of Calvinism. In 1815 Trinitarian Congregationalists were called upon to separate themselves from the "Liberals," and William Ellery Channing became the champion of Unitarianism, molding the movement rather as an influence among all denominations than as a denomination by itself.

An organization was effected, however, in 1825. For a brief period Ralph Waldo Emerson was the pastor of a Unitarian church in Boston, and another eminent leader in the movement was Theodore Parker. Unitarianism also claimed Bryant, Longfellow, Lowell and Holmes. Unitarians have been zealous in philanthropic and educational work. From the time of its founding, in 1817, until it became interdenominational in 1878, the divinity school of Harvard University was a Unitarian institution. There are at present about five hundred Unitarian congregations in the United States and Canada.

Consult Emerton's *Unitarian Thought;* Cooke's *Unitarianism in America.*

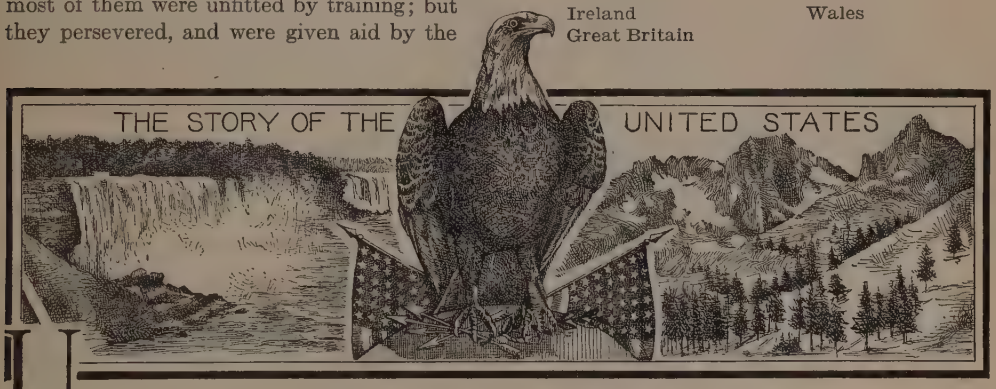
**UNITED EMPIRE LOY'ALISTS,** the name given to about 40,000 British colonists in America, who refused to join the revolting majority in 1776, and preferred, or sometimes were driven, to seek new homes in Canada. They formed important settlements in Nova Scotia

and Quebec, and created the provinces of New Brunswick and Ontario. They were the most important single element in Canada, and they supplied what has been essential to Canadian growth in the Empire—British predominance in Canada. Their coming, says Bourinot, the Canadian historian, "was the saving of British interest in the great region which England still happily retained in North America."

These Loyalists made no slight sacrifice. A few of them migrated to Canada during the Revolutionary War, but most of them moved in 1783 and 1784. Between 1776 and 1783 they had endured all manner of insult and persecution, often with great physical danger. They were, as a class, the well-to-do people of the thirteen colonies. Many of them abandoned valuable estates, and others gave up influential positions. From homes of comfort they fared northward on a difficult journey, and faced the hardships of pioneer life. They had to turn for a livelihood to farming, an occupation for which most of them were unfitted by training; but they persevered, and were given aid by the Canadian government. Each settler received 200 acres of land, and, if necessary, was also provided with implements, food and clothing. Most of them prospered, and from their ranks have come many of the men who have played a great part in Canada's history—Howe, Wilmot, Ryerson, Robinson and Cartwright, to name a few. No prouder Canadians live than those who can say that they are of "U. E. L." descent.

**UNITED KINGDOM,** a phrase used for the legal term UNITED KINGDOM OF GREAT BRITAIN AND IRELAND, refers to the political union of England, Ireland, Scotland and Wales. It was formally adopted on January 1, 1801, although it had been used by James I in 1604. At first the title roused much opposition. The geography, history, physical features and industries of the component parts of this kingdom are fully treated under the following headings in these volumes:

England
Ireland
Great Britain
Scotland
Wales




**UNITED STATES OF AMERICA,** the great central political division of North America, commonly referred to as the world's youngest and greatest republic. There is world-wide acknowledgment of its vastness, its richness and its power, but it is incorrect to say that it is the youngest of republics, for it is truly one of the oldest. The years from 1776 to the present represent a brief space, as the world estimates its eras, but when in the year named the English colonies in America declared themselves independent states there were no democracies in the world except Genoa, Venice, Switzerland and the Netherlands. These were small, feeble, and in many ways ineffectual, and as patterns for free governments could inspire but little hope. The example of the United States, which at once became the world's largest democracy, was the great influence behind the liberalizing of the nations which has steadily progressed for over a hundred years.

It has long been the proud and quite proper boast of the Englishman that "the sun never sets on British soil." The same claim can be made for the American republic, for when the last rays of the sun leave the westernmost coast of the Philippine Islands they are lighting the shores of the recently-acquired Virgin Islands, Porto Rico and the rocky shores of Maine. From the Saint Lawrence River, the Great Lakes and the international boundary line on the 49th parallel of north latitude on the north, to the Gulf of Mexico and the Rio Grande River, on the south, and from ocean to ocean, 3,100 miles—almost one-eighth of the distance around the world—stretches the continental area of the republic.

Within the territorial limits described are forty-eight states, independent in many of their governing functions but indissolubly joined into one state, incorporated as the United States of America. The continental area, exclusive of Alaska, comprises 3,026,789 square miles; with all outlying possessions, including the Virgin Islands, formerly the Danish West Indies, purchased in 1917, the grand total is 3,743,445 square miles. The British Empire is about three times as large, but continental United States is twenty-five times as large as England, Scotland, Wales and Ireland. The forty-eight states are nearly five times as large as Germany, France and Austria-Hungary, but the American states average only two-fifths as many people to the square mile. The forty-eight states are smaller in area than Canada, but including possessions, Canada is less than 15,000 square miles larger.

In 1867, the United States bought Alaska from Russia. Since the Spanish-American War in 1898 the United States has also acquired by annexation or by purchase other outlying possessions, including the Hawaiian archipelago, Samoa, Guam, the Philippine Islands, Porto Rico, the Virgin Islands (formerly Danish West Indies), and the Panama Canal Zone. These, with the forty-eight states lying compactly in the most temperate region of the continent, comprise the United States. This article will be limited to the continental area; each possession is fully discussed elsewhere. Attention is also directed to the fact that each animal, product and industry referred to is carefully treated in its alphabetical place in these volumes.

## *Relation to Other Countries*

North America as a whole faces toward the east and south, where the larger plains are located and where the principal rivers reach the sea. This is even more strikingly true of the portion of North America included within the United States. Moreover, the Atlantic Ocean is narrow, compared to the Pacific; and beyond it lies Europe, which for nearly 2,500 years has contained the principal centers of civilization. For these reasons, the United States has from the beginning of white settlement stood in very close relation to Europe; but until the last half century it has had relatively little to do with the countries west of the Pacific. This relation to Europe caused the earliest white settlements to be made on the eastern side, and has resulted in the greater density of population and development of industry on the Atlantic slope. Since the beginning of the sixteenth century Europe has been peopling the United States, but for only a decade or two have Asiatics been attracted across the Pacific Ocean, and even then in no such vast numbers as Europeans have come.

LOCATION MAP
Continental United States, exclusive of Alaska.

**Relations with Canada.** The relation of the United States to Canada is closer now than ever before. During colonial days, the English settlements along the Atlantic were separated from the French on the Saint Lawrence by the rugged, forest-clad district now included in Northern New England. As soon, however, as the English settlers began to cross the Appalachian Mountains they unavoidably came in contact with the French; the latter, carrying their light canoes over various portages from streams tributary to the Great Lakes into others flowing into the Mississippi, Hudson Bay or the Arctic Ocean, readily traversed the entire interior of the continent as far as the Rocky Mountains. In other words, the unbroken plains in the interior of the continent closely connect Canada and the United States, with the result that there is now intimate personal and commercial relationship throughout this region, regardless of the political boundary between the two countries; so, naturally, the Saint Lawrence route has always been an important outlet for the trade of the northern portion of the United States. It has, indeed, been less used by American commerce since the railroads to New York, Philadelphia, Baltimore and other Atlantic ports have been able to haul freight at low cost; but much foreign trade from the northern Mississippi Valley still goes by way of Montreal during the summer. On the other hand, the natural outlets of Montreal to the sea, when the Saint Lawrence is icebound, are not Halifax or even Saint John, N. B., which involve unnecessarily long hauls,

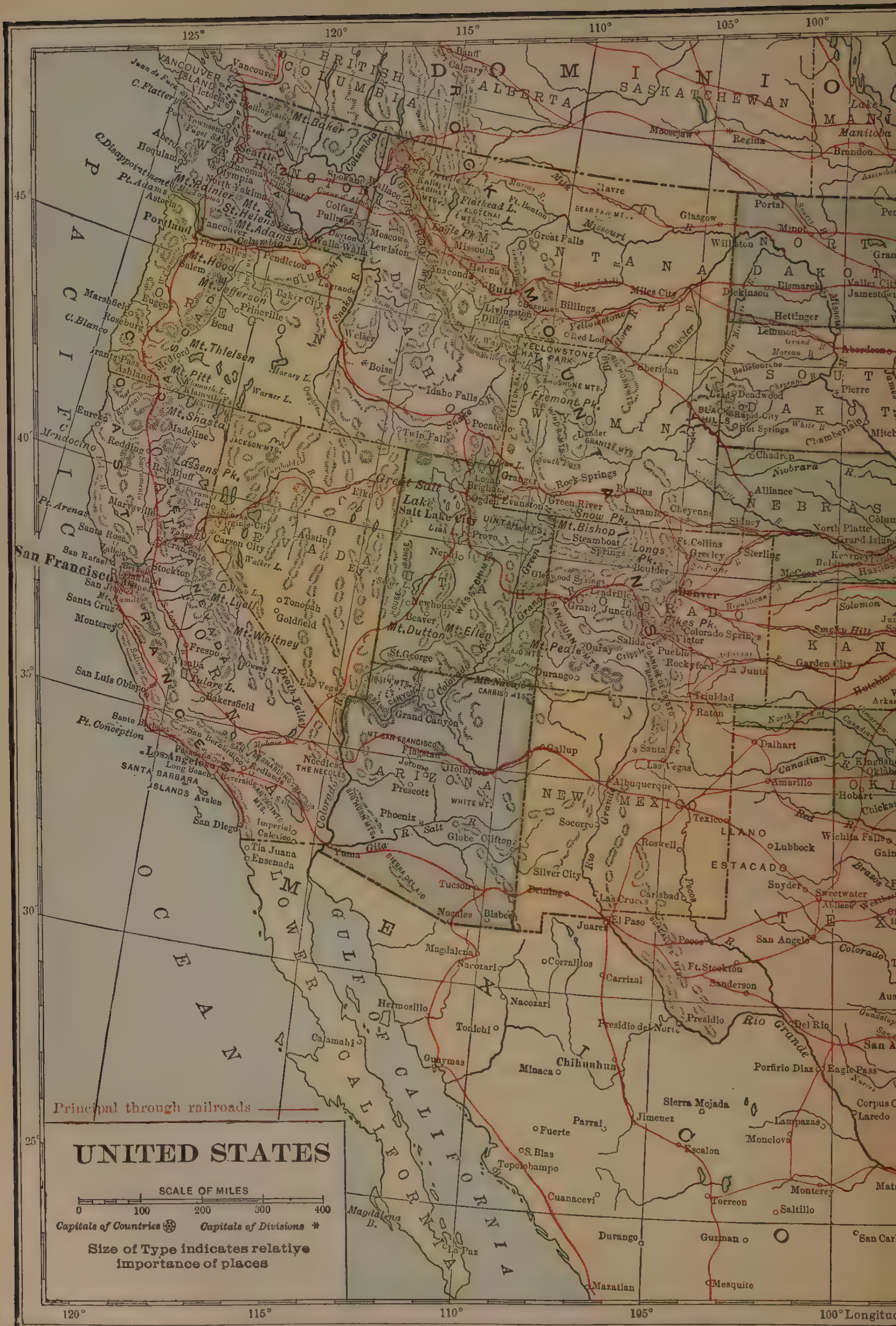
# THE UNITED STATES

| State | Area Sq. Mi. | Population Apr. 15, 1910 * | Population July 1, 1916 † | Per † Sq. Mi. | Capital | Population July 1, 1916 | Chief City Other than Capital | Population July 1, 1916 |
|---|---|---|---|---|---|---|---|---|
| Alabama | 51,998 | 2,138,093 | 2,332,608 | 45.5 | Montgomery | 58,221 | Birmingham | 181,762 |
| Arizona | 113,956 | 204,354 | 255,544 | 2.2 | Phoenix | 17,798 | Tucson | 16,750 |
| Arkansas | 53,335 | 1,574,449 | 1,739,723 | 33.1 | Little Rock | 57,343 | Fort Smith | 28,638 |
| California | 158,297 | 2,377,549 | 2,938,654 | 18.9 | Sacramento | 68,895 | Los Angeles | 503,812 |
| Colorado | 103,948 | 799,024 | 962,060 | 9.3 | Denver | 260,800 | Pueblo | 54,462 |
| Connecticut | 4,965 | 1,114,756 | 1,244,479 | 258.2 | Hartford | 110,900 | New Haven | 149,685 |
| Delaware | 2,370 | 202,322 | 213,380 | 108.6 | Dover | *3,720 | Wilmington | 94,265 |
| District of Columbia | 70 | 331,069 | 363,980 | 6,066.3 | | | | |
| Florida | 58,666 | 752,619 | 893,493 | 16.3 | Tallahassee | *5,018 | Jacksonville | 76,101 |
| Georgia | 59,265 | 2,609,121 | 2,856,065 | 48.6 | Atlanta | 190,558 | Savannah | 68,805 |
| Idaho | 83,888 | 325,594 | 428,586 | 5.1 | Boise | 33,846 | Pocatello | 12,293 |
| Illinois | 56,665 | 5,638,591 | 6,152,257 | 109.8 | Springfield | 61,120 | Chicago | 2,497,722 |
| Indiana | 36,354 | 2,700,876 | 2,816,817 | 78.1 | Indianapolis | 271,708 | Fort Wayne | 76,183 |
| Iowa | 56,147 | 2,224,771 | 2,224,771 | 39.9 | Des Moines | 101,598 | Sioux City | 57,078 |
| Kansas | 82,158 | 1,690,949 | 1,829,545 | 22.4 | Topeka | 48,726 | Kansas City | 99,437 |
| Kentucky | 40,598 | 2,289,905 | 2,379,639 | 59.2 | Frankfort | 11,080 | Louisville | 238,910 |
| Louisiana | 48,506 | 1,656,388 | 1,829,130 | 40.3 | Baton Rouge | 17,176 | New Orleans | 371,747 |
| Maine | 33,040 | 742,371 | 772,489 | 25.8 | Augusta | 14,170 | Portland | 63,867 |
| Maryland | 12,327 | 1,295,346 | 1,362,807 | 137.1 | Annapolis | 8,760 | Baltimore | 589,621 |
| Massachusetts | 8,266 | 3,366,416 | 3,719,156 | 462.6 | Boston | 756,476 | Worcester | 163,314 |
| Michigan | 57,980 | 2,810,173 | 3,054,854 | 53.1 | Lansing | 40,498 | Detroit | 571,784 |
| Minnesota | 84,682 | 2,075,708 | 2,279,603 | 28.2 | St. Paul | 247,232 | Minneapolis | 363,454 |
| Mississippi | 46,865 | 1,797,114 | 1,951,674 | 42.1 | Jackson | 29,737 | Vicksburg | 22,816 |
| Missouri | 69,420 | 3,293,335 | 3,410,692 | 49.6 | Jefferson City | 13,484 | St. Louis | 757,309 |
| Montana | 146,997 | 376,053 | 459,494 | 3.1 | Helena | 13,612 | Butte | 43,425 |
| Nebraska | 77,520 | 1,192,214 | 1,271,375 | 16.6 | Lincoln | 46,515 | Omaha | 165,470 |
| Nevada | 110,690 | 81,875 | 106,734 | 1.0 | Carson City | *2,466 | Reno | 14,869 |
| New Hampshire | 9,341 | 430,572 | 442,506 | 49.0 | Concord | 22,669 | Manchester | 78,283 |
| New Jersey | 8,224 | 2,537,167 | 2,948,017 | 392.3 | Trenton | 111,593 | Newark | 408,894 |
| New Mexico | 122,634 | 327,301 | 410,283 | 3.3 | Santa Fe | *5,072 | Albuquerque | 14,025 |
| New York | 49,204 | 9,113,614 | 10,278,375 | 215.6 | Albany | 104,199 | New York | 5,602,841 |
| North Carolina | 52,426 | 2,206,287 | 2,402,738 | 49.3 | Raleigh | 20,127 | Charlotte | 39,823 |
| North Dakota | 70,837 | 577,056 | 739,201 | 10.5 | Bismarck | *6,344 | Fargo | 17,389 |
| Ohio | 41,040 | 4,767,121 | 5,150,356 | 126.4 | Columbus | 214,878 | Cincinnati | 410,476 |
| Oklahoma | 70,057 | 1,657,155 | 2,202,081 | 31.7 | Oklahoma | 92,943 | Muskogee | 44,218 |
| Oregon | 96,669 | 672,765 | 835,741 | 8.7 | Salem | 20,278 | Portland | 295,463 |
| Pennsylvania | 45,126 | 7,665,111 | 8,522,017 | 190.1 | Harrisburg | 72,015 | Philadelphia | 1,709,518 |
| Rhode Island | 1,248 | 542,610 | 614,315 | 575.7 | Providence | 254,960 | Woonsocket | 44,360 |
| South Carolina | 30,989 | 1,515,400 | 1,625,475 | 53.3 | Columbia | 34,611 | Charleston | 60,734 |
| South Dakota | 77,615 | 583,888 | 698,509 | 9.1 | Pierre | *3,010 | Sioux Falls | 16,499 |
| Tennessee | 42,022 | 2,184,789 | 2,288,004 | 54.9 | Nashville | 117,057 | Memphis | 148,995 |
| Texas | 265,896 | 3,896,542 | 4,429,566 | 16.9 | Austin | 34,814 | Dallas | 124,527 |
| Utah | 84,990 | 373,351 | 434,083 | 5.3 | Salt Lake City | 117,399 | Ogden | 31,404 |
| Vermont | 9,564 | 355,956 | 363,699 | 39.9 | Montpelier | *7,856 | Burlington | 21,617 |
| Virginia | 42,627 | 2,061,612 | 2,192,019 | 54.4 | Richmond | 156,687 | Norfolk | 89,612 |
| Washington | 69,127 | 1,141,990 | 1,534,221 | 23.0 | Olympia | *6,996 | Seattle | 348,639 |
| West Virginia | 24,170 | 1,221,119 | 1,386,038 | 57.7 | Charleston | 29,941 | Huntington | 45,629 |
| Wisconsin | 56,066 | 2,333,860 | 2,500,350 | 45.3 | Madison | 30,699 | Milwaukee | 436,535 |
| Wyoming | 97,914 | 145,965 | 179,559 | 1.8 | Cheyenne | *11,320 | Sheridan | |
| Continental United States | 3,026,789 | 91,972,266 | 102,017,312 | 34.3 | Washington | 363,980 | | |
| Alaska | 590,884 | *64,356 | †64,834 | | Juneau | 1,644 | Fairbanks | 3,541 |
| Guam | 210 | 12,240 | a12,866 | | Agaña | | | |
| Hawaii | 6,449 | 191,909 | 215,741 | | Honolulu | 52,183 | Hilo | 6,745 |
| Panama Canal Zone | 442 | 61,279 | b31,048 | | | | | |
| Philippine Islands | 115,026 | 8,265,348 | 8,834,187 | | Manila | 236,940 | Iloilo | 19,054 |
| Porto Rico | 3,435 | 1,118,012 | 1,216,083 | | San Juan | 48,716 | Ponce | 35,005 |
| Samoa | 77 | 7,251 | a7,426 | | Pagopago | | | |
| St. Croix, St. John and St. Thomas Islands | 138 | | | | Christiansted | | | |
| Persons in military and naval service stationed abroad | | 55,608 | 45,123 | | | | | |
| Outlying possessions | 716,661 | | | | | | | |
| United States | 3,743,450 | | ‡112,444,620 | | | | | |

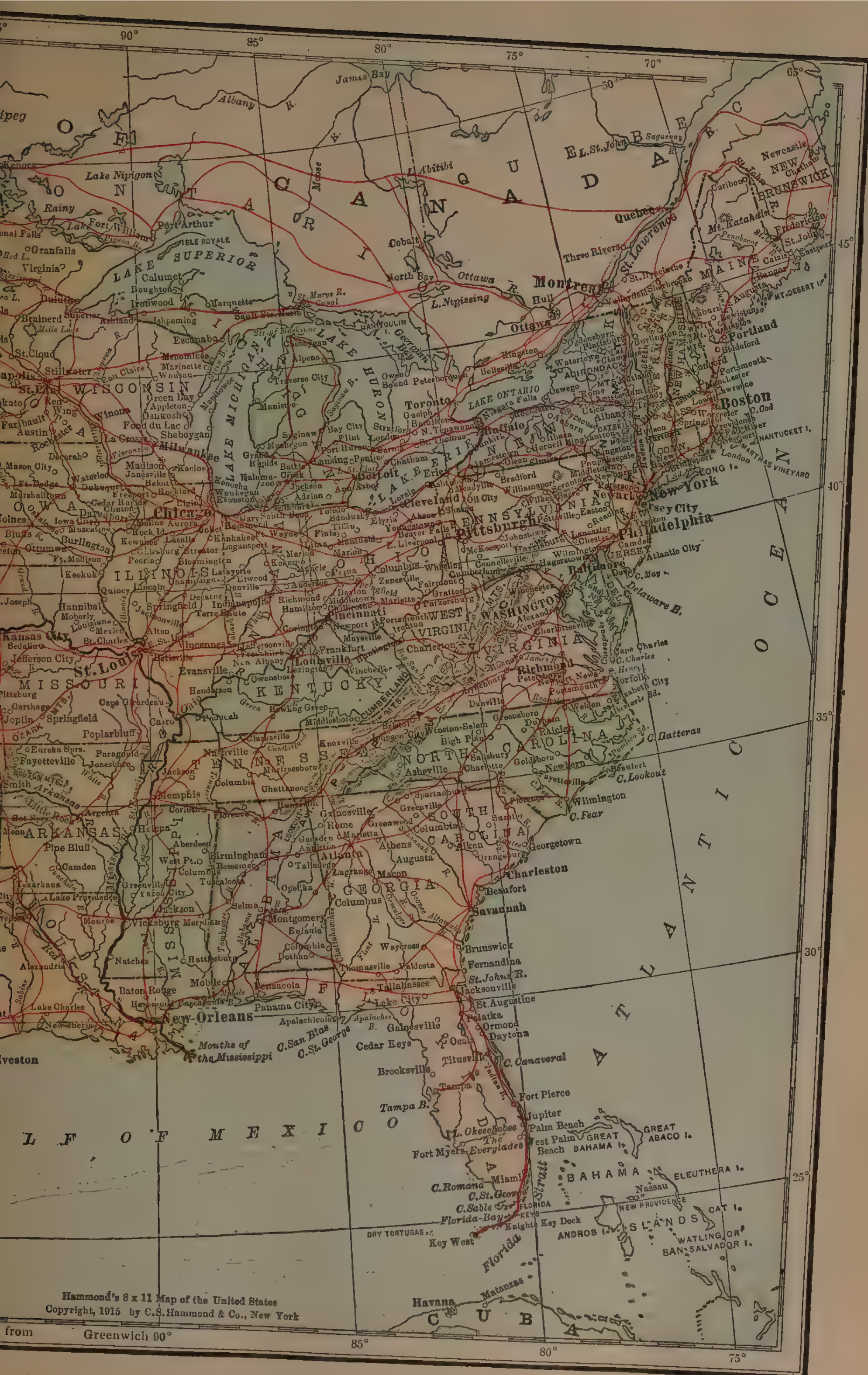
* Census of 1910. † Government estimate. ‡ Includes persons in military and naval service stationed abroad.

## CITIES OF FASTEST GROWTH, 1900 TO 1910

| Rank | City | Population 1910 | Pr. ct. inc. 1900–1910 | Rank | City | Population 1910 | Pr. ct. inc. 1900-1910 |
|---|---|---|---|---|---|---|---|
| 1. | Oklahoma City, Okla | 64,205 | 539.7 | 12. | El Paso, Tex | 39,279 | 146.9 |
| 2. | Muskogee, Okla | 25,278 | 494.2 | 13. | Tampa, Fla | 37,782 | 138.5 |
| 3. | Birmingham, Ala | 132,685 | 245.4 | 14. | Schenectady, N. Y | 72,826 | 129.9 |
| 4. | Pasadena, Cal | 30,291 | 232.2 | 15. | Portland, Ore | 207,214 | 129.2 |
| 5. | Los Angeles, Cal | 319,198 | 211.5 | 16. | Oakland, Cal | 150,174 | 124.3 |
| 6. | Berkeley, Cal | 40,434 | 206.0 | 17. | San Diego, Cal | 39,578 | 123.6 |
| 7. | Flint, Mich | 38,550 | 194.2 | 18. | Tacoma, Wash | 83,743 | 122.0 |
| 8. | Seattle, Wash | 237,194 | 194.0 | 19. | Dallas, Tex | 92,104 | 116.0 |
| 9. | Spokane, Wash | 104,402 | 183.3 | 20. | Wichita, Kan | 52,450 | 112.6 |
| 10. | Fort Worth, Texas | 73,312 | 174.7 | 21. | Waterloo, Iowa | 26,693 | 112.2 |
| 11. | Huntington, W. Va | 31,161 | 161.4 | 22. | Jacksonville, Fla | 57,699 | 103.0 |



UNITED STATES
SCALE OF MILES
0 100 200 300 400
Capitals of Countries
Capitals of Divisions
Size of Type indicates relative importance of places
Principal through railroads
125° 120° 115° 110° 105° 100°
100° Longitude
45° 40° 35° 30° 25°
PACIFIC OCEAN
GULF OF CALIFORNIA
LOWER CALIFORNIA
MEXICO
DOMINION
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
MANITOBA
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
TEXAS
LLANO ESTACADO
VANCOUVER ISLAND
Juan de Fuca Str.
C. Flattery
Victoria
Vancouver
Bellingham
Mt. Baker
Everett
Port Townsend
Puget Sd.
Aberdeen
Hoquiam
Seattle
Tacoma
Olympia
C. Disappointment
Pt. Adams
Astoria
Mt. Rainier
North Yakima
Ellensburg
Mt. St. Helens
Mt. Adams
Portland
Columbia R.
The Dalles
Pendleton
Walla Walla
Spokane
Colfax
Pullman
Dayton
Moscow
Lewiston
Wallace
Mt. Hood
Salem
Mt. Jefferson
Baker City
La Grande
Prineville
Bend
Eugene
Marshfield
Roseburg
C. Blanco
Grants Pass
Medford
Ashland
Mt. Thielsen
Mt. Pitt
Klamath L.
Klamath Fs
Harney L.
Warner L.
Snake R.
Weiser
Boise
Eureka
Mt. Shasta
Madeline
C. Mendocino
Redding
Red Bluff
Lassens Pk.
JACKSON MTS.
Humboldt R.
Pt. Arenas
Marysville
Reno
Sparks
Virginia City
Carson City
Tahoe L.
Sacramento
Santa Rosa
Vallejo
San Rafael
San Francisco
Berkeley
Oakland
Alameda
Stockton
San Jose
Mt. Hamilton
Santa Cruz
Monterey
Mt. Lyell
Tonopah
Goldfield
Walker L.
Austin
Ely
Elko
Mt. Whitney
Fresno
Visalia
Tulare L.
Owens L.
Death Valley
Las Vegas
San Luis Obispo
Bakersfield
Santa Barbara
Pt. Conception
San Bernardino
Pasadena
Los Angeles
Long Beach
Riverside
Redlands
SANTA BARBARA ISLANDS
Avalon
San Diego
Imperial
Calexico
Tia Juana
Ensenada
Needles
THE NEEDLES
Colorado R.
Yuma
Gila R.
Banff
Calgary
Moosejaw
Regina
Brandon
Lake Manitoba
Kalispell
Flathead L.
Eagle Pk.
Missoula
Helena
Anaconda
Butte
Great Falls
Ft. Benton
Marias R.
Milk R.
Havre
BEAR PAW MTS.
Missouri R.
Glasgow
Williston
Portal
Minot
Bismarck
Dickinson
Jamestown
Valley City
Hettinger
Lemmon
Aberdeen
Miles City
Billings
Bozeman
Livingston
Dillon
Yellowstone R.
Red Lodge
YELLOWSTONE NAT. PARK
Big Horn R.
BIG HORN MTS.
Sheridan
Powder R.
Idaho Falls
Pocatello
Twin Falls
SHOSHONE MTS.
Fremont Pk.
WIND R. MTS.
Lander
GRANITE MTS.
Lead
Deadwood
BLACK HILLS
Rapid City
Hot Springs
Pierre
Chamberlain
White R.
Chadron
Niobrara R.
Alliance
Sidney
North Platte
Grand Island
Kearney
McCook
Rock Springs
Rawlins
Green River
Laramie
Cheyenne
Great Salt Lake
Salt Lake City
Ogden
Logan
Evanston
UINTAH MTS.
Provo
Utah L.
Mt. Bishop
Steamboat Springs
Longs Pk.
Ft. Collins
Greeley
Sterling
Boulder
Denver
Glenwood Springs
Leadville
Grand Junction
Pikes Pk.
Colorado Springs
Victor
Cripple Creek
Salida
Pueblo
Rocky Ford
La Junta
Ouray
Mt. Peale
Durango
Trinidad
Raton
Garden City
Nephi
Newhouse
Beaver
Mt. Dutton
Mt. Ellen
St. George
Mt. Navajo
Grand Canyon
Flagstaff
Jerome
Holbrook
Prescott
Phoenix
Salt R.
Globe
Clifton
Gallup
Santa Fe
Las Vegas
Albuquerque
Dalhart
Amarillo
Canadian R.
Socorro
Texico
Roswell
Lubbock
Silver City
Tucson
Deming
Las Cruces
Carlsbad
Pecos R.
Nogales
Bisbee
El Paso
Juarez
Pecos
Snyder
Sweetwater
Abilene
San Angelo
Ft. Stockton
Sanderson
Magdalena
Nacozari
Corralitos
Carrizal
Hermosillo
Tonichi
Presidio del Norte
Presidio
Rio Grande
Del Rio
Porfirio Diaz
Eagle Pass
Calamahi
Guaymas
Minaca
Chihuahua
Sierra Mojada
Jimenez
Parral
Fuerte
S. Blas
Topolobampo
Escalon
Lampazas
Monclova
Laredo
Corpus Christi
Monterey
Saltillo
Torreon
Cuanacevi
Durango
Guzman
Mazatlan
Mesquite
Magdalena B.
La Paz


Hammond's 8 x 11 Map of the United States
Copyright, 1915 by C.S.Hammond & Co., New York
from Greenwich 90°
85°
80°
75°
70°
65°
50°
45°
40°
35°
30°
25°
ONTARIO
QUEBEC
CANADA
James Bay
Albany R.
L. Abitibi
Lake Nipigon
Port Arthur
Fort William
ISLE ROYALE
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
Georgian Bay
LAKE ERIE
LAKE ONTARIO
St. Lawrence
Quebec
Montreal
Ottawa
Three Rivers
Toronto
Kingston
NEW BRUNSWICK
MAINE
NEW HAMPSHIRE
MASS.
CONN.
NEW YORK
PENNSYLVANIA
NEW JERSEY
WEST VIRGINIA
VIRGINIA
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
FLORIDA
ALABAMA
MISSISSIPPI
LOUISIANA
ARKANSAS
TENNESSEE
KENTUCKY
OHIO
INDIANA
ILLINOIS
MISSOURI
IOWA
WISCONSIN
MICHIGAN
Boston
Portland
New York
Philadelphia
Baltimore
WASHINGTON
Richmond
Norfolk
Pittsburgh
Buffalo
Cleveland
Detroit
Chicago
Milwaukee
St. Paul
Duluth
St. Louis
Kansas City
Cincinnati
Louisville
Indianapolis
Nashville
Memphis
Atlanta
Birmingham
Chattanooga
Charleston
Savannah
Jacksonville
New Orleans
Mobile
Pensacola
Tampa
Key West
Miami
Havana
C. Hatteras
C. Lookout
C. Fear
C. Canaveral
Delaware B.
NANTUCKET I.
MARTHAS VINEYARD
LONG I.
MT. DESERT I.
ATLANTIC OCEAN
GULF OF MEXICO
Mouths of the Mississippi
Florida Strait
BAHAMA ISLANDS
GREAT ABACO I.
GREAT BAHAMA I.
ELEUTHERA I.
ANDROS I.
NEW PROVIDENCE
Nassau
CAT I.
WATLING OR SAN SALVADOR I.
DRY TORTUGAS
FLORIDA KEYS
CUBA
Matanzas

# THE UNITED STATES

| States | Origin and Meaning of Names | Earliest Permanent Settlement | | | Admitted to Union | Popular Cognomen |
|---|---|---|---|---|---|---|
| | | Year | Locality | By Whom | | |
| Alabama | Indian: Place of rest | 1702 | Mobile Bay | French | 1819 | Cotton State |
| Arizona | Spanish-Indian: meaning uncertain | 1776 | Tucson | Spaniards | 1912 | |
| Arkansas | From Indian Kansas | 1686 | Arkansas Post | French | 1836 | Bear State |
| California | Name of imaginary island in old Spanish romance | 1769 | San Diego | Spaniards | | Golden State |
| Colorado | Spanish word meaning red or ruddy | 1858 | Denver | Americans | 1876 | Centennial State |
| Connecticut | Indian: Long river | 1633 | Hartford | Dutch | *1788 | Nutmeg State |
| Delaware | Named for Lord de la War | 1631 | Lewes | Dutch | *1787 | Blue Hen State |
| Florida | Spanish word: Flowers | 1565 | St. Augustine | Spaniards | 1845 | Peninsular State |
| Georgia | Named for George II of England | 1733 | Savannah | English | *1788 | Cracker State |
| Idaho | Indian: Gem of the mountains | 1860 | Oro Fino Crup | Americans | 1890 | |
| Illinois | Indian-French: Tribe of men | 1675 | Kaskaskia | French | 1818 | Prairie State |
| Indiana | Indian's ground | 1731 | Vincennes | French | 1816 | Hoosier State |
| Iowa | Indian: Beyond | 1833 | Dubuque | Americans | 1846 | Hawkeye State |
| Kansas | Indian: Smoky water | 1827 | Ft. Leavenworth | Americans | 1861 | Sunflower State |
| Kentucky | Indian: Dark and bloody ground | 1774 | Harrodsburg | Americans | 1792 | Blue Grass State |
| Louisiana | Named for Louis XIV of France | 1718 | New Orleans | French | 1812 | Creole State |
| Maine | The Mainland | 1623 | Saco | English | 1820 | The Pine Tree State |
| Maryland | Named for Henrietta Maria of England | 1634 | St. Mary's | English | *1776 | Old Line State |
| Massachusetts | Indian: Place of great hills | 1620 | Plymouth | English | *1788 | Bay State |
| Michigan | Indian: Great Lake | 1668 | Sault St. Marie | French | 1837 | Wolverine State |
| Minnesota | Indian: Cloudy Water | 1824 | Ft. Snelling | Americans | 1858 | North Star State |
| Mississippi | Indian: Father of Waters | 1699 | Biloxi | French | 1817 | Bayou State |
| Missouri | Indian: Muddy water | 1735 | Ste. Genevieve | French | 1821 | |
| Montana | Spanish: Mountainous | 1846 | Ft. Benton | Americans | 1889 | Mountain State |
| Nebraska | Indian: Shallow water | 1823 | Bellevue | Americans | 1867 | |
| Nevada | Spanish: Snowy | 1849 | Carson Valley | Americans | 1864 | Silver State |
| New Hampshire | Named for Hampshire, England | 1623 | Little Harbor | English | *1788 | Granite State |
| New Jersey | Named for Island of Jersey | 1617 | Bergen | Dutch | *1787 | Blue State |
| New Mexico | Aztec Mexitl, the God of War | 1640 | Santa Fé | Spanish | 1910 | |
| New York | Named for the Duke of York | 1623 | Manhattan Is. | Dutch | *1788 | Empire State |
| North Carolina | Named for Charles II of England | 1660 | Albemarle | Virginians | *1789 | Old North State |
| North Dakota | Indian: Allied | 1812 | Pembina | Scotch | 1889 | Sioux State |
| Ohio | Indian: Beautiful River | 1788 | Marietta | Americans | 1803 | Buckeye State |
| Oklahoma | Indian: Beautiful Land | 1890 | Guthrie | Americans | 1907 | |
| Oregon | Indian: Beautiful Water | 1811 | Astoria | Americans | 1859 | Beaver State |
| Pennsylvania | Penn's Woods | 1638 | Chester | Swedes | *1787 | Keystone State |
| Rhode Island | Named for the Island of Rhodes | 1636 | Providence | English | *1790 | Little Rhody |
| South Carolina | Named for Charles II of England | 1670 | Ashley River | English | *1788 | Palmetto State |
| South Dakota | Indian: Allied | 1832 | Ft. Pierre | Americans | 1889 | Coyote State |
| Tennessee | Indian: River of great bend | 1757 | Ft. London | Americans | 1796 | Volunteer State |
| Texas | Indian: Friends | 1685 | Matagorda Bay | French | 1845 | Lone Star State |
| Utah | Indian: Mountain dwellers | 1847 | Salt Lake City | Americans | 1896 | |
| Vermont | Green Mountain | 1724 | Ft. Dammer | Americans | 1791 | Green Mountain State |
| Virginia | Named in honor of Queen Elizabeth of England | 1607 | Jamestown | English | *1788 | Old Dominion |
| Washington | Named for George Washington | 1845 | Turnwater | Americans | 1889 | Evergreen State |
| West Virginia | (See Virginia) | 1727 | Shepherdstown | Penn Dutch | 1863 | Panhandle State |
| Wisconsin | Indian: Wild Rushing Channel | 1718 | Green Bay | French | 1848 | Badger State |
| Wyoming | Indian: Great Plain | 1832 | Ft. Laramie | Americans | 1890 | |

*Thirteen original states.

## AREA AND POPULATION OF CONTINENTAL U. S. SINCE FIRST CENSUS

| Census Year | Gross Area Square Miles | Population | Increase Over Preceding Census | | Adjusted per-centages Increase |
|---|---|---|---|---|---|
| | | | Number | Per cent. | |
| 1910 | 3,026,789 | 91,972,266 | 15,977,691 | 21.0 | 21.0 |
| 1900 | 3,026,789 | 75,994,575 | 13,046,861 | 20.7 | 20.7 |
| 1890 | 3,026,789 | 62,947,714 | 12,791,931 | 25.5 | 24.9 |
| 1880 | 3,026,789 | 50,155,783 | 11,597,412 | 30.1 | 26.0 |
| 1870 | 3,026,789 | 38,558,371 | 7,115,050 | 22.6 | 26.6 |
| 1860 | 3,026,789 | 31,443,321 | 8,251,445 | 35.6 | 35.6 |
| 1850 | 2,997,119 | 23,191,876 | 6,122,423 | 35.9 | 35.9 |
| 1840 | 1,792,223 | 17,069,453 | 4,203,433 | 32.7 | 32.7 |
| 1830 | 1,792,223 | 12,866,020 | 3,227,567 | 33.5 | 33.5 |
| 1820 | 1,792,223 | 9,638,453 | 2,398,572 | 33.1 | 33.1 |
| 1810 | 1,720,122 | 7,239,881 | 1,931,398 | 36.4 | 36.4 |
| 1800 | 892,135 | 5,308,483 | 1,379,269 | 35.1 | 35.1 |
| 1790 | 892,135 | 3,929,214 | | | |

## GROWTH OF AREA OF UNITED STATES SINCE 1790

| Accession | Gross area (sq. mi.) | Accession | Gross area (sq. mi.) |
|---|---|---|---|
| Continental U. S. | 3,026,789 | Outlying possessions | 716,517 |
| Area of U.S. in 1790[1] | 892,135 | Alaska, 1867 | 590,884 |
| Louisiana Pur., 1803 | 827,987 | Hawaii, 1898 | 6,449 |
| Florida, 1819 | 58,666 | Philippines, 1899 | 115,026 |
| Territory gained by Treaty with Spain, 1819 | 13,435 | Porto Rico, 1899 | 3,435 |
| Texas, 1845 | 389,166 | Guam, 1899 | 210 |
| Oregon, 1846 | 286,541 | Samoa, 1900 | 77 |
| Mex. Cession, 1848 | 529,189 | Panama Canal Zone, 1904 | 436 |
| Gadsden Pur., 1853. | 29,670 | St. Croix, St. John and St. Thomas Islands, 1917 | 138 |

[1]Includes the drainage basin of the Red River of the North, not a part of any acquisition, but previously considered a part of the Louisiana Purchase.

but rather Portland, Maine, and Boston, Mass., the ocean ports nearest by rail and having the easiest grades to Montreal.

The relations between the kindred peoples in the United States and Canada have also grown more intimate because of the fact that for a full century there has been peace between them—peace so profound that no vessel of war is needed to protect it, and not a fort marks the international boundary. Indeed, it is a matter of mutual agreement that neither country shall maintain even a gunboat on the Great Lakes or the Saint Lawrence River. In these circumstances each country has naturally become almost as much interested in the prosperity of the other as in its own, since each prospers when its neighbor and customer prospers. (See INTERNATIONAL RELATIONS, pages 3021-3022.)

**Different Conditions in the South.** The relations between the United States and Mexico are by nature much less intimate. Northern Mexico, lying in the zone of light and uncertain rainfall, is a semi-desert country, and the bulk of the Mexican population is located in the southern part of the country, on plateaus 5,000 to 8,000 feet above sea level and very difficult of access. There is also the barrier of difference in race and language. In spite of these obstacles, however, the construction of railroads in Mexico connecting with those in the United States has stimulated business relations until now the bulk of Mexican exports go to the United States, and citizens of the latter country have invested many hundreds of millions of dollars in Mexican railways, mines and farm lands. Investments in Mexico are hazardous, however, because in that land of frequent revolutions property rights are not always respected. In contrast to Canada, therefore, Mexico has attracted few settlers from the United States.

**Other Relations.** The relation of the United States to the West Indies and Central America is of still another kind. At a very early date the English colonies on the mainland began an active trade with the West Indies, since they offered a good market for lumber and fish. After the American Revolution this trade was continued, especially by the New England states. West India trade naturally attracted attention to the Isthmus of Panama, which was a barrier to similar trade with the Pacific coast. As early as 1835, the Senate, at the suggestion of Senator Clay of Kentucky, passed a resolution declaring the interest of the United States in a canal across the Isthmus of Panama. In 1855, following the discovery of gold in California, the Panama railroad was completed by American capital. This was the first transcontinental railroad in North America, preceding by fourteen years the Union Pacific (see RAILROADS, TRANSCONTINENTAL). It consequently played a large part in the development of the Pacific slope. Meantime, the project of a canal across the isthmus was not forgotten, though the War of Secession and the settlement and development of the upper Mississippi Valley diverted public attention to purely internal matters for a generation. The Spanish-American War again sharply drew public attention to foreign affairs, especially to the Panama Canal project. The first step toward the realization of this plan was the Platt Amendment, legislation which secured to the United States coaling stations in Cuba, and made that island a virtual protectorate of the United States. This was a matter of great importance, because Cuba is located on the direct routes from both the Atlantic and Gulf ports to the Isthmus of Panama. Later the United States secured the same rights with reference to the Republic of Panama, in addition to the virtual ownership of the Canal Zone and of the Panama Railroad. Controlling both the approaches and the isthmus, the United States then set to work upon the Panama Canal, which was completed in the ten years between 1904 and 1914.

**The Revolutionizing Panama Canal.** This waterway has revolutionized the relation of the United States to other countries. For the east coast of South America, indeed, the canal offers no direct advantage. In fact, South America might really be called East America, since practically all of it lies east of Florida. By reason of this location, the relation of the east coast of South America had been, up to the period of the War of the Nations in 1914, more intimate with Europe than with the United States. The latter country began to profit in its trade relations in Eastern South America with the opening of hostilities in Europe. On the other hand, the entire west coast of South America is far closer to the United States by way of the canal than to Europe by any route; and the ports of the United States, especially those on the Gulf of Mexico, when compared to Liverpool, have an advantage in the Western Pacific as far west and south as Hong-kong and Sydney. The Panama Canal, therefore, is rendering the relations of the United States to these countries much more intimate than they

have been in the past, at the same time furthering the development of all the countries bordering the Pacific so as to benefit all parts of the world. The United States, lacking a merchant marine, permitted Europe practically a monopoly of trade with South America until the completion of the canal and the outbreak of the great war in 1914. Since then American merchants have opened the way to profitable trade relations with the southern republics.

## *Size, Coast Line and Physical Features*

In the matter of size, among the continents North America ranks third, after Asia and Africa, while in the proportion of coast line to area it ranks second, being exceeded only by Europe. The more indented the coast line, the greater is the proportion of coast line to area, and therefore the more abundant are the opportunities for oversea commerce. In the portion of North America included within the United States, the proportion of coast line is perhaps greater than for the continent as a whole, especially along the North Atlantic coast. This portion of the continent has sunk somewhat in recent geological time, thus drowning the lower valleys beneath the sea and causing innumerable inlets which form excellent harbors.

On the other hand, the South Atlantic and Gulf coasts have risen somewhat in recent geological time, causing the sea to be shallow for a considerable distance off shore and rendering approach to the land difficult. On the Pacific coast there are relatively few good harbors, owing to the Coast Range, which rises directly from the sea, the principal inlets being the Golden Gate at San Francisco, the Columbia River and Puget Sound, all of which penetrate through the Coast Range to the interior valleys.

**Physical Features.** The United States exhibits most of the physical features found in North America as a whole. There are five main geographic divisions, as follows:

(1) The Atlantic coastal plain,
(2) The Appalachian highland,
(3) The interior plain,
(4) The Cordilleran Highland (see CORDILLERA),
(5) The Pacific slope.

Each of these in turn comprises various smaller subdivisions.

*The coastal plain* is mostly submerged in New England, the sea almost washing the foot of the uplands, but it increases in width toward the south, becoming broadest along the Gulf of Mexico. This plain formed part of the ocean floor in recent geological times, and the rocks in it are still soft. The soil is sandy near the sea, but clayey farther inland. Along the inner edge of the coastal plain, where the rivers pass from older and larger rocks to the softer ones of the plain, is a regular "fall line," that is, a series of falls or rapids in the rivers. This fall line, which affords water power and, in some cases, forms the head of stream navigation, is marked by a row of important cities, all the way from Trenton, N. J., to Montgomery, Ala. (See FALL LINE.)

*The Appalachian highland* consists of four belts, roughly parallel to each other, extending from New England to Alabama. Just above the fall line is a hilly district called the Piedmont (meaning foot-of-the-mountain), which is much older than the coastal plain. This varies a good deal in fertility, depending upon the kind of underlying rock which by its decay has formed the surface soil. In general, however, the Piedmont Region is fairly fertile, except where the slope is so steep that the rains have washed away most of the soil. West of the Piedmont rises a mountain range known as the Green Mountains in Vermont, the Highlands in New Jersey, the Blue Ridge in Virginia, the Great Smoky and the Unakas farther south. In general, however, it is usually called the Blue Ridge. This range is quite steep throughout the southern part of its course, but has been cut through by a number of rivers, forming water gaps. These gaps are of great importance because they furnish routes for highways and railroads at low levels.

West of the Blue Ridge, again, is a belt of lower land known in New York as the Hudson Valley, in Pennsylvania as the Cumberland, in Virginia as the Shenandoah, and farther south as the valley of East Tennessee, but called as a whole simply the Great Valley. This depression, caused partly by the sinking of blocks of the earth's crust and partly by a belt of soft rocks which the rivers wore away faster than the harder rocks on either side, extends all the way from Canada to Alabama, varying greatly in width, but averaging perhaps forty to sixty miles. The bottom of the Great Valley is fairly level, except where rivers have cut channels or where smaller ridges of hard rock rise above the general elevation of the surface. The soil has been partly formed on the spot from the soft,

COMPARISON OF AREAS OF THE UNITED STATES AND EUROPE

nderlying rocks, and partly brought down rom the hills by the streams. In either case it s as a rule very fertile, with the result that the Great Valley is occupied by prosperous farms, nd contains many important towns.

West of the Great Valley rises what appears, s seen from the valley, to be another mountain ange, but is in fact merely the abrupt edge of great plateau which slopes down gradually vestward toward the Mississippi Valley. This lateau, called the Catskills in New York, the lleghany in Pennsylvania and the Cumberland Mountains in the South, has been deeply cut nto by numerous rivers, giving much of it a ery rugged surface and rendering good wagon oads difficult to build and to maintain. A arge portion of it is also covered with thin, andy soil, which washes away as soon as the rost leaves the ground and in any case repays ut scantily the farmer's toil. For all these easons population is sparse throughout most f the Alleghany-Cumberland belt, except here minerals are worked or factories have een established. Only in a few of the valleys and in certain areas where the soil is underlaid by limestone is there any considerable number of prosperous farms. In fact, this district, away from the large towns, is one of the least advanced in the country.

*The interior plain* extends from the Alleghany-Cumberland plateau to the Rocky Mountains and from the Gulf of Mexico to the Arctic Ocean, thus including, as here defined, the westward extension of the coastal plain. Only low divides separate the waters flowing south from those flowing north, hence this interior part of the continent offers no serious obstacles to transportation. There are, however, several smaller highland areas. The most important are (1) the uplands on both shores of Lake Superior, which are a continuation of the Laurentian highlands of Canada; (2) the Ozark plateau in Missouri and Arkansas, which is of much the same age and character as the Cumberland plateau, and (3) the Black Hills, an outlying portion of the Rocky Mountains.

Aside from these highlands, the interior plain has in general a fertile soil. In the south this

has been formed by decay of the underlying rocks or has been deposited by running water; but north of the Ohio and Missouri most of it is of glacial origin, having been deposited in a previous geological age by a great ice sheet like that which now covers the interior of Greenland. In this portion of the interior plain, there are certain districts too rough and rocky, and others too sandy or swampy, for profitable farming. Along the lower Mississippi there are likewise considerable areas of marsh lands. Near the Rocky Mountains, where the plain gradually rises as it approaches the foothills, it becomes more rolling, because the rivers have cut deeper valleys. In general, however, the larger part of the interior plain is adapted to agriculture, and this consequently is by far the leading agricultural section of the country.

*The Cordilleran, or Western, highland* is sometimes said to include the entire region from the Rocky Mountains to the Pacific Ocean. As here defined, however, it extends only to the Sierra Nevada-Cascade range, including three distinct subdivisions. The *Rocky Mountains,* forming the continental water parting between the Atlantic and the Pacific oceans, present a practically continuous front toward the east, though a tongue of the plains in Wyoming does penetrate some distance into the mountains, forming the route of the Union Pacific railroad. Between the Rockies and the Sierra Nevada-Cascade range lies a lofty plateau traversed by numerous lesser ranges. This plateau is drained in part by the Columbia and the Colorado rivers, but in part it forms the *Great Basin* in Utah and Nevada, which has no outlet to the sea. Finally, the *Sierra Nevada-Cascade range,* bounding this plateau on the west, is cut through by several rivers, notably the Columbia. Taken as a whole, the Cordilleran highland is broken by no waterway, and its lowest pass is about a mile above sea level. It thus obstructs commerce far more than do the Appalachians.

The Pacific slope includes two subdivisions, the Pacific valleys and the Coast ranges. The *Pacific valleys* comprise the broad and fertile San Joaquin-Sacramento in California, the Willamette in Oregon, and the valley surrounding the Puget Sound. Beyond these valleys lie the *Coast ranges,* which descend so abruptly to the Pacific as to leave no room for a coastal plain at their base. Only at the extreme southern end of California, where the mountains trend east and west, do they recede from the coast so as to leave a coastal plain.

**Climate.** In North and South America the mountain ranges run nearly north and south, while in the Old World they run, in general, east and west. North and south ranges act as moisture barriers, because they lie directly across the course of the prevailing winds, whether in the tropics or in the temperate zones. On the other hand, east and west mountain ranges act as temperature barriers, causing quite different types of climate on their northern and southern slopes. This is illustrated in the case of the Alps.

Owing to the north and south direction of the mountain ranges, North America, though divided by the accident of history between Canada and the United States, is by nature a climatic as well as a topographic unit showing no abrupt change at any point between the Gulf of Mexico and the Arctic Ocean. On the other hand, the climatic changes are more abrupt from east to west. The Atlantic slope, especially in New England, being exposed to winds from both the land and seas, has a variable climate. Indeed, Mark Twain always insisted that New England has no climate at all, but merely samples of weather. The great interior plain is subject to extremes of heat and cold, like Russia and Siberia; while the Pacific coast, where western winds prevail, has a mild, oceanic climate like Western Europe.

The rainfall likewise varies from east to west, being heavy on the Atlantic and Gulf coasts, lighter in the interior, which is farther from the source of moisture, and heavier again on the Pacific slope. From about the 100th meridian (running through the center of the Dakotas) westward to the Sierra Nevada range the rainfall is usually insufficient for the type of agriculture found in the eastern part of the country. The north and south trend of the mountains, which tends to equalize the temperature of wide areas, thus at the same time checks the moisture-laden west winds and renders nearly half of the continent arid or semiarid in character.

The United States lies entirely outside the tropics, although the southern tips of Florida and of Texas lack but little of having a tropical climate. In the United States, as in other temperate regions, the distribution of moisture is influenced by the passage of cyclonic storms (see Cyclone). It is a familiar fact that air has weight, but this weight is not entirely constant, owing to unequal heating by the sun and to other causes. Wherever the air is lighter than the average it tends to rise, while the

RELIEF MAP OF THE UNITED STATES

heavier air on all sides of such an area pushes toward the center. As the air rises it is chilled and drops part of its moisture, which falls either as rain or snow. Such areas of low pressure are constantly traveling across the continent from west to east, as may be seen by examining a weather map; and it is largely in this way that the moist air is drawn into the interior of the continent from the Atlantic Ocean and the Gulf of Mexico. In the interior of the country east of the Rocky Mountains the heaviest rainfall is in the summer, during the growing season, while west of the Rocky Mountains the prevailing rainfall is as a rule in winter, when the land is cooler than the sea and chills the west winds which blow over it from the ocean. (See WEATHER BUREAU.)

*Effects of Varied Climate.* The combined effect of all these climatic influences is seen in the distribution of types of plants and animals. A life-zones map is therefore, in a real sense, a general climatic map. Such a map has been worked out by the Biological Survey in the Department of Agriculture at Washington, and it may be had upon request. It will be noted that the mountains carry the cool northern climate into the very heart of the South, while all the climatic belts bend to the north in the interior plain, owing to the great heat of summer in that region. This makes it an easy matter to grow crops farther north than would otherwise be possible. The alternation of heat and cold is also favorable to activity both of body and of mind.

## *The People of the United States*

During colonial days many people of exceptional character and intelligence were driven to America from Europe by civil or religious persecution at home. This applies not only to the Puritans in New England but also to Catholics in Maryland, Quakers and Germans in Pennsylvania and the Huguenots in South Carolina. Each of these phases of settlement is discussed in the subhead *History,* under the several states named. While the number of those who came for such reasons was perhaps smaller than the number who were moved by a desire to better their condition, they nevertheless absorbed the entire mass and gave a touch of idealism to the American character which it has never lost.

**Immigration.** Previous to the Revolutionary War most of the settlers, aside from the negro slaves, were of British origin, though Pennsylvania was nearly half German. After the Revolution, immigration remained light down to about 1840, but thereafter it increased in

volume from year to year, and with extraordinary rapidity. During the first half century after 1840 a large part of the immigration came from Northern and Western Europe; since about 1890, with improvement of economic conditions in those parts of Europe and the opening up of other new countries, notably Australia, Canada, Argentine and South Africa, the number coming from Northern Europe has greatly decreased. During the same period an enormous flood of immigration has set in from Southern and Eastern Europe. It decreased greatly after the beginning of the War of the Nations in 1914, the number arriving in 1916 being only 298,800, against 1,219,000 in 1914.

The early immigrants largely came in search of free land and became farmers, but the newer, for the most part, have found employment in cities, so there have grown up in each of the large cities districts inhabited almost exclusively by immigrants of one nationality and language. In spite of this fact, the second generation in most cases appears to be interested in the United States rather than in Europe, so the process of making the immigrants over into American citizens still goes on successfully, though the foreign languages and customs are long maintained in such segregated districts. The early Dutch in New York and the Swedes in New Jersey have long since lost their racial characteristics, and few traces of the former settlements exist. Family names alone connect the past with the present in these regions of early settlement.

The Indians in the United States are neither numerous nor during the last decade important. Some of them are still on reservations and are supported by the government; only in Oklahoma, which includes what was formerly the Indian Territory, have many persons of Indian descent become citizens of the United States; and even there the Indians are largely outnumbered by the whites. See INDIANS, AMERICAN.

On the other hand, the negroes who were brought in as slaves and freed as a result of the War of Secession have continued to increase with great rapidity, though somewhat less rapidly than the whites. Even in the South the whites are multiplying faster than the negroes, except in a few districts. Serious friction has arisen between the blacks and whites in various districts, not only in the South but with increasing frequency in the North, and it is not clear how this race question is to be solved. That is one of the problems left for the future.

**Religion and Education.** In the United States religion is purely a private matter, while education is principally a public matter, thus reversing the situation found in some European countries. Aside from certain Oriental and Mohammedan immigrants, practically the entire population is connected with some form of the Christian religion, every branch of it being represented.

According to statistics carefully compiled by the various sects the number of communicants in each leading Church and the relative

| DENOMINATIONS | MINISTERS | CHURCHES | COMMUNICANTS |
|---|---|---|---|
| Adventists (6 bodies) | 1,233 | 2,742 | 106,347 |
| Baptists (15 bodies) | 43,546 | 57,520 | 6,307,055 |
| Brethren (Dunkers) (4 bodies) | 3,554 | 1,260 | 123,844 |
| Catholic (Eastern Orthodox) (7 bodies) | 338 | 419 | 467,500 |
| Catholic (Western) (3 bodies) | 19,462 | 15,302 | 14,079,208 |
| Christians | 1,066 | 1,360 | 113,887 |
| Church of Christ, Scientist | 2,828 | 1,414 | 85,096 |
| Congregationalists | 5,923 | 6,108 | 771,362 |
| Disciples of Christ (2 bodies) | 8,261 | 11,143 | 1,522,821 |
| Friends (4 bodies) | 1,471 | 998 | 120,712 |
| German Evangelical Synod | 1,085 | 1,378 | 264,097 |
| Jewish Congregations | 1,084 | 1,769 | 143,000 |
| Latter-Day Saints (2 bodies) | 4,135 | 1,680 | 397,000 |
| Lutherans (21 bodies) | 9,688 | 15,269 | 2,434,184 |
| Mennonites (12 bodies) | 1,476 | 760 | 61,331 |
| Methodists (16 bodies) | 42,088 | 62,728 | 7,472,108 |
| Presbyterians (12 bodies) | 14,012 | 16,530 | 2,104,039 |
| Protestant Episcopal (2 bodies) | 5,621 | 8,141 | 1,051,696 |
| Reformed (4 bodies) | 2,155 | 2,782 | 502,602 |
| Salvation Army | 2,961 | 941 | 27,664 |
| Spiritualists | ..... | 2,100 | 200,000 |
| Unitarians | 512 | 469 | 70,542 |
| United Brethren (2 bodies) | 2,185 | 4,022 | 360,387 |
| Universalists | 656 | 763 | 55,000 |

strength of the different creeds appear in the table on the preceding page.

The above list represents fewer than one-half of the recognized religious bodies in the country, but includes three-fourths of the number of communicants. A most interesting table is the following, which records the net gains of the leading Churches in the number of communicants between 1890 and 1915, a period of twenty-five years:

| DENOMINATION | GAIN |
|---|---|
| Roman Catholic | 7,817,646 |
| Methodist Episcopal | 1,417,240 |
| Southern Baptist | 1,425,055 |
| Methodist Episcopal, South | 862,059 |
| Baptist (Colored) | 669,879 |
| Presbyterian (Northern) | 706,933 |
| Disciples of Christ | 722,112 |
| Baptist, North | 452,183 |
| Protestant Episcopal | 508,842 |
| Lutheran Synodical Conference | 464,233 |
| Congregationalists | 258,591 |
| African M. E. | 167,275 |
| African M. E. Zion | 218,820 |
| Lutheran General Council | 145,925 |
| Lutheran General Synod | 191,432 |
| United Brethren | 136,741 |
| Presbyterian (South) | 152,618 |
| Latter-Day Saints, Utah | 185,648 |
| Reformed (German) | 116,441 |

*Education.* Originally free public schools were established only for the elementary branches, because it was thought that a person desiring a more advanced education could afford to pay for it. This practice, however, was inconsistent with the doctrine of democracy, since it meant that many children of ability would be denied opportunities for education because their parents could not afford the expense. Such a plan would result in society becoming divided into a series of classes more or less hereditary, based on the possession of property. In order to give an equal chance to all, it was necessary to extend the system of free public schools through the high school and the university, and this has now been done in all parts of the country. In spite of this fact, it is still true that the proportion of persons over ten years of age who are unable to read and write is much larger in the United States than in the countries of Northwestern Europe. This condition is partly due to the enormous immigration from Southern and Eastern Europe, where the standard of education is very low; in part, to the negro population, which has to a great extent remained illiterate; and in part to the poverty in certain sections, which has hindered the progress of effective education of the whites as well as of the negroes. The proportion of illiterates, however, is in process of reduction, except as recruited by immigration. A table for illiteracy not only for states of the American Union but for the principal nations of the world is given in the article ILLITERACY.

Compared to the most advanced countries of Europe, the greatest defects in the schools of the United States are chiefly two: (1) the general elementary course covers eight years instead of six, which involves much repetition and waste of time; (2) technical and trade schools are not yet adequately developed, with the result that skilled artisans are mostly of foreign birth and training. (See the articles EDUCATION and SCHOOL, and allied articles there referred to.)

*Summary of Educational Progress.* The educational history of the United States may be roughly divided into the colonial period, the period from the Revolution to the War of Secession and the period since the War of Secession. The policies of the colonies toward education differed radically. In Virginia and South Carolina it was entirely a private matter; the unfortunates who could not have a tutor or go to Europe for their education simply went without it. Among the Quakers and Germans in Pennsylvania, New Jersey and New York the school was frequently under the auspices of the Church. Farthest from Virginia's practice was Massachusetts, where three fundamental principles were laid down: (1) the right of the state to require that its citizens shall be educated; (2) the right of the state to compel local governmental divisions to establish schools; (3) the right of the local divisions to support these schools by taxation. Of the higher institutions of learning founded during the colonial period, private enterprise in every case gave the initiative. The eight colonial colleges, in the order of their foundation, were Harvard, William and Mary, Yale, Princeton, Columbia, Pennsylvania, Dartmouth and Rutgers.

At the end of the colonial period there was already apparent a change in the attitude of the states toward education, a desire to make each system fit the opportunity. Until the War of Secession, however, the private academy and the private or endowed college were the outstanding features. The public school system was being developed; there was a growing feeling that the state was responsible for the preliminary education of its citizens. But not until after the War of Secession did the states

assume the predominance which they now hold. The remarkable growth of state universities, of agricultural and technical colleges, of free high schools and primary schools—in short, free education from the lowest to the highest schools—has been the evidence of changing ideals in American education. Endowed schools and colleges are still numerous, but the mass of the people receive their education at the hands of the state. The educational work which the states are now doing is described in the article on each state.

## *Natural Resources*

**Furs and Fish.** In surveying the resources of the United States, the several classes of industries will be taken up by sections, following somewhat the historical order of their development. In such a survey furs and fish claim first attention.

*Furs.* It was fish that first brought the French to Canada, and furs that drew not only the French but also many of the English frontiersmen into the interior of the continent. Furs, being largely the product of cold, forested regions, have declined in importance as the forests have been cleared for farming purposes. Some of the most valuable fur-bearing animals, such as the beaver, have, indeed, almost disappeared from the United States; although furs are still obtained in the forested mountains and in the northern swamp districts. Some animals, however, such as the muskrat, mink and skunk, seem able to maintain themselves in settled districts, and they now furnish a large part of the furs marketed in the United States.

Since 1867 Alaska has been the greatest fur-producing region under the control of the United States, yielding not only the ordinary land furs but also the very valuable sealskin and sea-otter furs (see SEAL). In recent years both of these have become scarce, but fur farms have been established on some of the Alaskan islands, where the rare black and silver fox are reared in captivity. Canadians have the advantage of the United States climatically in the development of this industry; on Prince Edward Island, in particular, are large and very profitable fox farms.

*Fish.* More valuable by far than furs are fish, which form the only considerable food supply still furnished freely by nature. Fish abound in nearly all shallow waters, but are firmer fleshed in the colder regions, where they can also be more readily marketed without spoiling. The most important fishing banks are consequently located in high latitudes, either near the continents or in fresh-water lakes, where the fish feed and spawn at certain seasons. By means of refrigeration fresh fish from the sea coast are now easily shipped to the interior of the United States, while cured fish are largely shipped to the tropics. Some varieties, such as salmon, are usually canned for market.

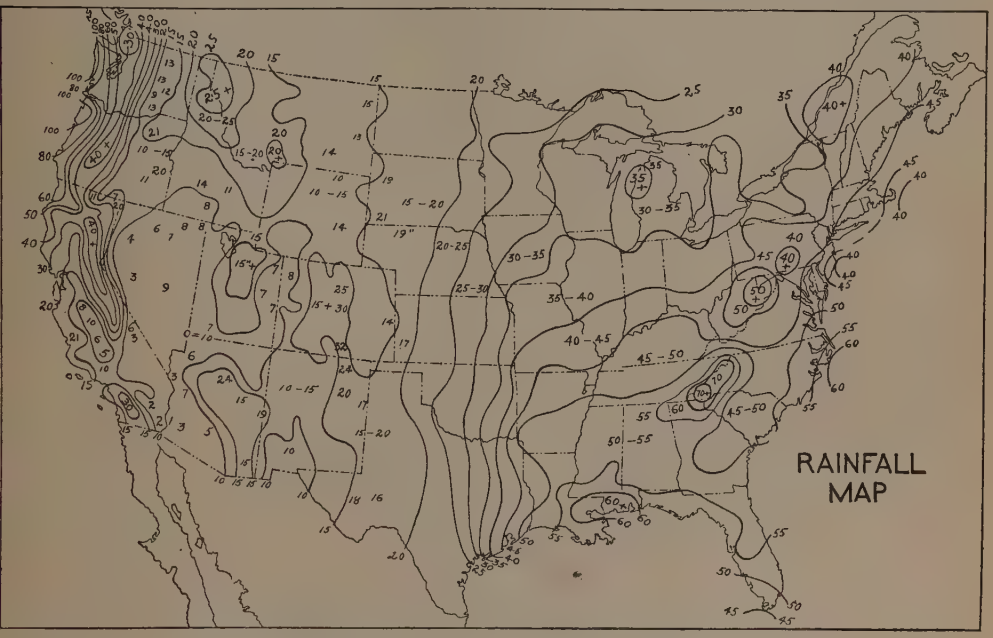
Along the North Atlantic coast the broad continental shelf, or fringe of land, but slightly submerged beneath the sea and washed by the cold Labrador Current, affords excellent fishing grounds. Fishing consequently became an important industry in New England at a very early date. The deep-sea fishery off the New England coast yields chiefly cod and haddock; the inshore fishery, herring and mackerel. All these are usually salted or smoked for market, although on the Maine coast young herring are canned in oil, like sardines, and are sold as such. In the Middle Atlantic states shad are also taken in large numbers as they ascend the rivers. In addition, menhaden are extensively caught for use as fertilizers on worn-out soils. Other important products are lobsters, crabs, clams and, in sheltered waters from Cape Cod south, oysters. The most productive oyster beds are in Long Island Sound and in Chesapeake Bay. By far the most important fishery products along the North and Middle Atlantic coast are the cod and oyster. The fishing industry of New England is largely centered at Gloucester and Boston, while the most important oyster port is Baltimore.

Along the Southern coast there are many varieties of fish which are more or less taken for market, though none is as important commercially as the cod in the North. Shrimps, oysters and the huge green sea turtles of Florida, however, are of considerable commercial importance. Still more valuable is the Florida sponge fishery around Key West, though the production fails to meet the American demand.

In the interior of the continent the fisheries of the Great Lakes and the Mississippi River support a considerable population. The most important lake species are whitefish, salmon, trout and sturgeon. In the rivers the German carp, although considered a nuisance by sports-

men, has become a market fish of some importance.

On the Pacific coast, San Francisco has succeeded New Bedford, Mass., as the headquarters of most of the whaling vessels under the American flag, which hunt in far northern and far southern waters. The Oregon, Puget Sound and Alaska waters swarm in season with salmon, which are taken by nets, traps and wheels driven by the current. Fish hatcheries are now necessary to maintain the supply. Canned salmon is the principal fishery product exported from the United States. The leading canning




AVERAGE ANNUAL RAINFALL, IN INCHES

centers are Astoria, Ore., at the mouth of the Columbia, and Seattle, Wash.; in Alaska the salmon pack is over half that of the United States. The catch of halibut in the West is much larger than in the Atlantic, some being shipped even to New England; and there are immense cod and herring banks almost untouched. (Each fish named in the above account is described in its alphabetical place in these volumes.)

**Forest Resources.** Originally the eastern half of the United States was nearly all forested. Only in the districts west and immediately south of the lower end of Lake Michigan did the prairies penetrate further east than the Mississippi. In the west the land was mostly without forest cover because of the lack of sufficient rainfall except upon the mountains. It is thought that the Indians, who frequently set fire to the prairie grass to improve the pasture for the buffalo, may also have had some influence in limiting the growth of forests. On the prairie slope the mountains were generally forested, and so were the lowlands in the well-watered district toward the north.

The North Atlantic and the Great Lakes districts developed chiefly pine and other cone-bearing trees, and this was also the case on the sandy coastal plain in the South. On the other hand, the region south of the Great Lakes and also the southern uplands were forested mostly with hard woods. In the west the coniferous (cone-bearing) forests also prevailed. The early settlers were compelled to clear away the forest as quickly as possible, in order to raise food crops, and they soon came to hate the forest, not only as an impediment to agriculture but also as a hiding place for wild beasts and hostile Indians.

On this account immense quantities of timber were destroyed without any thought of its value, or the possible time when trees might have to be replanted. In addition to such destruction there was also still more extensive cutting of timber for commercial purposes, especially in the northern part of the country, where the winter snow furnished good roads.

Moreover, forest fires, started by accident, and sometimes by carelessness or design, have probably destroyed as much timber as was ever cut. Through these various means the area of standing timber has been reduced until it amounts to only a little more than one-fourth of the total land area, which is not much greater than the proportion in Germany, which has been peopled for many hundreds more years. In recent years the rapid advance in price of lumber has shown that a timber famine is to be expected unless the remaining forests are carefully safeguarded and other forests are planted on land too rocky or too sandy for successful use in agriculture.

Experience in other countries has also shown that forests can best be maintained as a permanent investment by the state, since the individual may not live long enough to see a forest crop mature. For these reasons the United States government has in recent years established numerous forest reserves which are handled on business principles, and several of the states, notably New York and Pennsylvania, are following this example. It is undoubtedly true that considerable land still under forest may well be cleared for farming, but there is still more land already cut over and burned over which ought to be reforested, if the United States is not to suffer acutely in the near future for the lack of forest products. At the present time the largest cut of timber is in the South, although the state of Washington exceeds any other single state in its output. The South is also the principal source of turpentine and rosin.

**Minerals.** Modern civilization differs from civilization in ancient times, or in China to-day, in no respect more strikingly than in the greater use which it makes of mineral resources. In fact, if civilization were deprived of minerals, all modern manufactures would become impossible, and so would modern methods of transportation. In all ages important mineral deposits have attracted population, but at no time has this attraction been more in evidence than to-day. Butte, Montana, built over a great copper deposit, and Johannesburg, South Africa, a city built on gold, are typical examples. From the sea, the forest, the farm and the mine are derived all the materials used in the most complex industries—everything, in fact, of a material sort which can help to satisfy the needs of men. Of these several sources of materials, the mine is second in importance only to the soil.

The United States is exceptionally well endowed not only in respect to soil but also as to mineral resources. These are found not only in the two great highland areas and in the lesser highlands in the interior plain, but also in portions of the plains themselves.

*Structural Materials.* The most widely used minerals are structural materials, employed for building purposes. Stone of various kinds was no doubt the first mineral resource, and is still one of the most important. Originally employed for tools and weapons, it now serves chiefly for buildings and surfacing highways. Granite, the most endurable stone, is quarried in many localities throughout the United States (see QUARRY AND QUARRYING, subhead *Extent of the Industry*). Another stone which takes a high polish is marble, formed from limestone by heat and pressure during the upheaval of the mountain ranges. Next to Vermont, Georgia and Tennessee have the largest output of marble. Other kinds of stone of commercial importance are trap rock, of volcanic origin; limestone and sandstone, both formed originally under water; and slate, a sedimentary rock transformed by great heat and pressure. Measured by value of product, indeed, limestone and sandstone far exceed in value both granite and marble, since they are quarried in the plains as well as in the mountains and are used more extensively for ordinary purposes.

Limestone is also necessary in the smelting of iron ore and the manufacture of concrete, which is employed in building bridges, tunnels, etc. The largest production of limestone is in Pennsylvania, Indiana and Ohio, while New York, Pennsylvania and Ohio lead in sandstone (see page 4886). Slate is quarried chiefly in the Appalachian Mountains, especially in Pennsylvania and Vermont.

*Fertilizers.* Another important class of minerals comprises fertilizing materials. Experience shows that three chemical elements tend to become exhausted in soil long under cultivation, namely, nitrogen, phosphorus and potassium, yet these elements are absolutely necessary to crop production. In the United States no deposits containing these elements have been found in usable quantities, except in the case of phosphorus. In the South, extending from Tennessee through the Carolinas into Florida, are vast prehistoric bone beds, probably the remains of marine animals; these yield phosphate of lime, which is of great value in renewing worn-out soil. Salt, associated in places with gypsum and marking the margin of a former

sea, is worked in a zone extending from New York through Michigan and Iowa to Kansas. See FERTILIZER.

*Metals.* Next to stone the metals were doubtless the earliest minerals used by man. Stone, copper and iron have successively formed the mechanical basis of civilization, and have given their names to the ages of Stone, Bronze and Iron. Gold and silver, which early attracted attention by their color and luster, have long been called the precious metals, but in their importance to mankind these are insignificant compared to the great industrial metals, iron, copper, zinc, tin and aluminum. Some gold has been produced in the Appalachian highlands, especially in North Carolina and in Georgia, where the gold fields had their day of excitement before the great rush to California in 1849, but these are deposits of slight importance. The gold-bearing gravels, forming a belt twenty to sixty miles wide along the western foothills of the Sierra Nevada Mountains, were originally panned by hand. Later came hydraulic mining, which was finally checked by law because it filled up rivers and damaged agricultural lands in the lower valleys by washing huge amounts of sand down the rivers. Now gold dredges run by electricity are working over these gravels again for a third time. For many years, however, the largest output of gold has been from the vein mines.

Most of the states in the Cordilleran highland have now become producers of gold, especially Colorado, Nevada and the Black Hills district in South Dakota. Mercury is indispensable in the process of separating gold from its ores, as well as in scientific instruments. The principal mines in the United States are in California. Silver is produced more than ten times as abundantly as gold, but the total value of the annual output is less than that of gold, because of the lower price per ounce, the ratio being at current prices from 1 to 25 to 1 to 30, or thereabouts. The principal silver producing states are Nevada, Montana and Utah.

Of the industrial materials, iron is vastly the most important, since no other material is adapted to use in fine tools and power machinery for either manufacturing or transportation. Iron ore is widely distributed in the United States, though the districts where it is found in sufficient quantities for mining are not very numerous. During colonial days some ores were worked in the Northern Appalachian highlands, and during the early part of the nineteenth century the iron ores around Lake Champlain were used. Later the principal sources of supply were found in Pennsylvania and Ohio, while at the present time by far the largest output of iron is in the Lake Superior highland, especially in Minnesota. Next to this Lake Superior district comes the southern district, the most productive mines being around Birmingham, Alabama. In the Cordilleran highland there are said to be many deposits of iron ore, of which only a few are worked, owing in part to the lack of coal in the vicinity.

Next to iron, the most important industrial material is copper, largely because it is so extensively used in electrical machinery. Among all the nations of the world the United States has the largest output of copper, as it has of iron. One important production district is the point jutting out from the south into Lake Superior. For many years this held first place in the production of copper, but recently the largest output has been in the Cordilleran highlands, especially in Arizona and Montana. Michigan now follows these two states in production. Zinc and lead frequently occur in the same deposits and are used to some extent for the same purposes, as in the preparation of paints, although each has separate uses as well.

Zinc is produced to some extent in the Appalachian highlands, especially in New Jersey and in portions of Virginia and Tennessee. A second zinc district comprises portions of Wisconsin, Illinois and Iowa, where the three states meet, while a third is found in the Ozark region of Missouri and Kansas, which in 1912 had the largest output of zinc. In the Cordilleran highland, the principal output of zinc is in Colorado, which produces somewhat less than New Jersey.

Lead is mined in nearly the same regions, though the output in the Appalachian highland is less important. Missouri holds first rank in the output of both lead and zinc, with Idaho, and Utah next in lead. In the Cordilleran region lead is in part a by-product of silver, being obtained from the same ore.

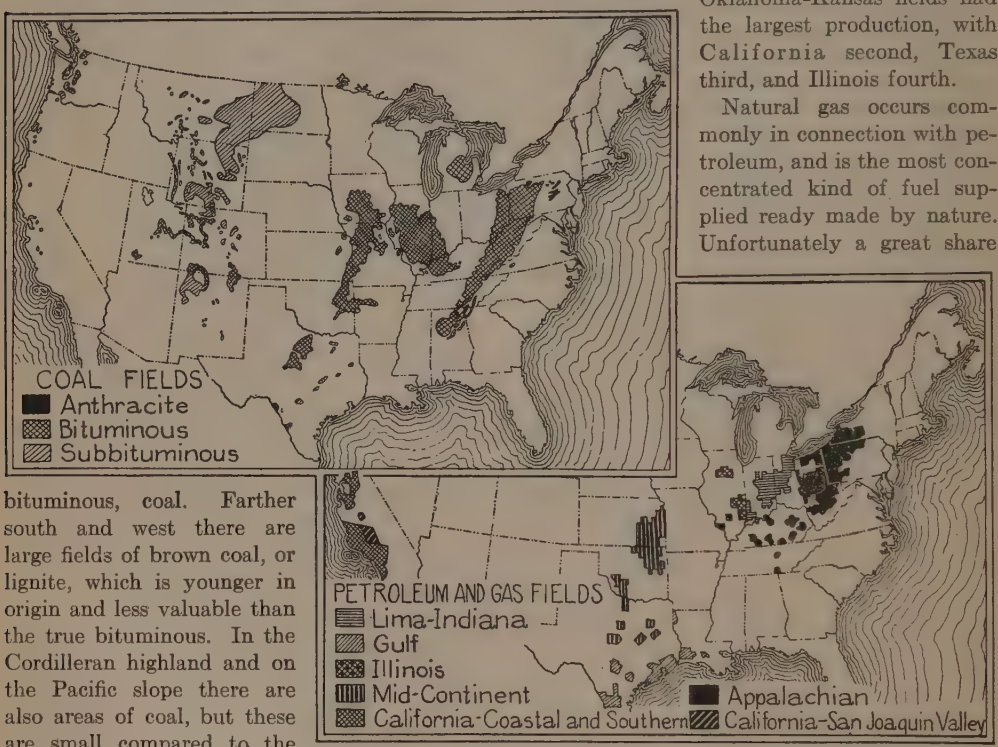
Tin is the one great industrial metal not obtained in the United States in large quantities, although small deposits have been located in North Carolina, Texas, California, the Black Hills district and in Alaska. The world's largest producer of tin for many years was Wales, but the southwestern tip of England (Cornwall) now leads.

*Mineral Fuels.* Next to the great industrial metals the most important to mankind of all mineral resources are the mineral fuels, in-

cluding coal, oil and gas. The production of all of these is larger in the United States than in any other country in the world. In some districts of Eastern Pennsylvania are found the principal deposits of hard, or anthracite, coal, now used chiefly for stoves and furnaces. On the western slope of the Appalachian highland, in the Alleghany and Cumberland plateaus and also in the adjacent portion of the interior plain are found enormous quantities of soft, or bituminous, coal. Farther south and west there are large fields of brown coal, or lignite, which is younger in origin and less valuable than the true bituminous. In the Cordilleran highland and on the Pacific slope there are also areas of coal, but these are small compared to the great fields found in the Appalachians and in the central plain. Taken as a whole, the United States contains a larger area of coal fields than is possessed by all of Europe. There are also important coal deposits in Alaska, though these are as yet little worked. The government-built railroad, authorized by Congress in 1914, will stimulate Alaska's coal-mining industry. In 1912 the Appalachian fields produced over two-thirds of the total output in the United States. The leading coal mining states, in the order of their importance, are Pennsylvania, West Virginia, Illinois, Ohio and Kentucky.

Petroleum was first obtained in this country in Western Pennsylvania, about 1859. Later the production spread south and west, but fell off in the older fields. In recent years immense oil pools have been opened on the Pacific coast and in the Central plain. During 1916 the Oklahoma-Kansas fields had the largest production, with California second, Texas third, and Illinois fourth.

Natural gas occurs commonly in connection with petroleum, and is the most concentrated kind of fuel supplied ready made by nature. Unfortunately a great share of it has been wasted, either by escaping into the air unused or by being burned at the well mouth to no purpose. This has been one of the most frightful wastes of natural resources of which there is record. Unlike petroleum, natural gas is still produced more extensively in the Appalachians than elsewhere, the most productive state being West Virginia. The maps above give this information in graphic form.




## *Wealth in the Farms*

In every part of the world where men have made their homes they have found it necessary to adapt the mode of life to the resources which nature placed at their disposal. For example, the first colonists in the United States were saved from actual starvation only by planting corn which they obtained from the Indians. Moreover, this native crop, which grew readily in the forest clearings made by ring-barking the trees, certainly was a great aid in the occupation of America by the white race, alike in the North and in the South.

In the North Atlantic colonies, when first established, no crops could be found for which there was a demand in Europe. The settlers were therefore compelled to raise crops chiefly for their own use and to rely upon fish and forest products for exports. This kind of agriculture led to a system of small farms worked by their owners, which in turn produced a democratic type of society. In Virginia and the more southern colonies, on the other hand, the soil and climate favored the growth of staple crops, especially tobacco and cotton, for which there was a good market abroad. The settlers therefore adopted a commercial type of agriculture, aiming to produce such crops for the market. In order to do this they began the importation of contract labor and finally of African slaves (see SLAVERY). This sort of farming gave rise to an aristocratic system based on large plantations which continued down through the War of Secession, and in a measure survives even to the present time.

When settlers first reached the upper Mississippi Valley, those broad and fertile acres offered great incentive for grain growing, and thus stimulated the invention of agricultural machinery. The use of such machinery was especially stimulated by the War of Secession, which withdrew so many of the able-bodied men from the fields. As a result, the north-central section of the United States went into grain growing almost exclusively, exporting the produce, not only to the Eastern states and to the South, but also to Europe. Continuous grain growing on the same land, however, especially continuous wheat growing, exhausted the fertility of the soil so that the older states in this section have gradually changed to the system of mixed farming, growing a variety of crops and keeping dairy cattle. Only in the newer states is the system of exclusive grain growing still practical. See ROTATION OF CROPS.

**North Atlantic Section.** At the present time agriculture in the states along the North Atlantic is mostly specialized. Owing to the presence of many large cities there is a great demand for milk, as well as butter and cheese. Dairying is, therefore, on the whole, the leading farm industry, and *hay* is the leading crop. *Potatoes* are extensively grown in parts of Maine and of New York, since they are suited to a moist climate and do well on rather poor soil. In the level districts of the Middle states, where farm machinery can be used to advantage, *wheat* is an important crop, while *rye* and *oats* are grown, even on poor land. Special crops requiring more labor to the acre are vegetables and *sugar beets*, which are grown in Western New York; *fruits* along the Great Lakes and the Chesapeake Bay, and *tobacco* along the eastern slope of the Appalachian Mountains, as well as in the Connecticut Valley and in Wisconsin. New York now holds first place in the value of its fruit crop. Near the great cities vegetables are produced for the markets, to some extent in greenhouses with artificial heat. This is possible even in competition with the South, because the freight rates on perishable products are very high, if shipped from a distance.

**The South.** In the Southern states, both along the Atlantic and the Gulf, two staple crops are prominent. In Kentucky, Virginia and the states immediately to the south the leading crop grown for market is *tobacco*. This is very adaptable as to soil and climate, but each district seems to produce a different quality. In North Carolina, for example, a light-yellow tobacco owes its peculiar character to a thin, sandy soil long considered nearly worthless. The United States grows and exports more tobacco than any other country in the world.

South of Virginia and Kentucky tobacco shares the honors with *cotton;* while south of Tennessee cotton is still king, as before the War of Secession, exceeding in value every other Southern crop. For successful cotton growing a long summer with abundant moisture is necessary, and for the production of the longest fibre nearness to the sea appears to be advantageous.

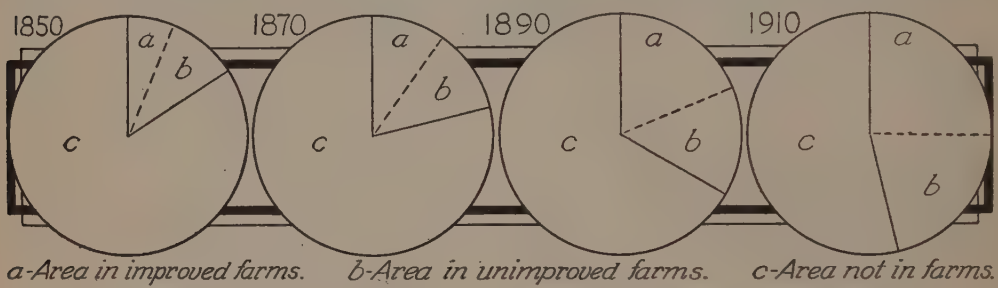
The United States is by far the largest producer of raw cotton and of cotton-seed products. The principal obstacle to an even greater development of cotton growing is the necessity of picking the fiber from the plant by hand. On this account various attempts have been made to invent a cotton-picking machine. Some of these machines, yet in the experimental stage, operate by suction and are run by gasoline. If a really successful cotton-picking machine could be invented, it would work a profound revolution in the cotton industry. For one thing, it would tend to displace the negroes from the land and drive them to the cities, since they are now kept upon the farms chiefly in order to have sufficient help during the cotton-picking season.

On the low, hot coast lands, *rice* and *sugar cane* are the prevailing crops. Rice was for many years the leading crop along the coast of South Carolina, but floods caused by cutting away the forests on the mountains have in re-

cent years caused great damage in the Carolina rice fields. Some time after the War of Secession rice cultivation spread to well-drained prairies in Eastern Texas and Louisiana. On such land the harvester and steam thresher could be used, and by 1885 these had replaced the scythe and the flail. Nothing so revolutionary had ever before happened in rice growing. Using such machinery, one man produced sixty-four times as much rice as a laborer in India. At the present time the greater part of the rice crop in the United States comes from this far Southern district, though only a small portion of the land in that region suitable for rice growing is under cultivation. For more than a century, that is, since 1795, sugar cane has been the principal crop of Louisiana, and it has spread to some extent along other parts of the Gulf coast. In the latitude of Louisiana it demands for success a great expenditure of capital and labor, since the cane must be replanted each year, whereas in Cuba and Hawaii it grows for several years without replanting.

Throughout the South *corn* is the principal crop for local consumption. Corn bread and pork are the staple food for farm laborers. On the Appalachian uplands and the central black prairie of Texas and Oklahoma, winter *wheat* and *oats* are also grown to some extent. These winter crops have a decided advantage in the South compared to corn, since they do not require attention during the season when other crops must be harvested, and they protect the soil during the winter. In many parts of the South, especially in the Atlantic coastal plain where the mountains on the west keep off the winds from the interior and the Gulf stream flows close in shore, early fruits and vegetables are largely planted for northern markets. In the Piedmont Region, and also in the Ozark district, *peaches* and other soft fruits are extensively grown on the hillsides, while along the mountain side runs a belt of *apple* orchards rising from 1,200 feet in Virginia to 3,000 feet in South Carolina. That such perishable products can be grown successfully so far from the market is due to special fast trains and special cars equipped to maintain an even temperature, summer and winter. In order to avoid loss from overstocking the market and not to be at the mercy of the middlemen, the fruit and vegetable growers in the older districts have organized coöperative companies which employ expert agents to oversee the shipping and marketing of their stock.

Other important crops in the South are *peanuts, oranges* and *grapefruit.* Norfolk, Virginia, has long been the leading market for peanuts, but the crop is now grown extensively as far west as Oklahoma. Orange and grapefruit orchards east of the Rocky Mountains are mostly confined to Florida. Severe frosts have damaged them several times in the northern section of that state, but they have been replanted, and the crop is now larger than ever before. In the extreme South the cocoanut, pineapple and mango also reach maturity.




RELATIVE PROPORTIONS OF LAND, IMPROVED AND UNIMPROVED

*Stock raising* in the South is largely for local use; on most plantations *hogs* are raised for this purpose. These are in part of the half-wild razorback variety, and they forage in the woods for their living. More could easily be raised, except that they would require to be fed, and the South hardly grows enough corn for other uses, because corn requires cultivation at the same time as cotton. In spite of the warm, damp climate, some *sheep* are raised, partly in the uplands and partly in the pine forests on the coastal plains. In Western Texas sheep raising attains real importance, and the same district pastures great herds of cattle. Cattle raising has, however, been somewhat limited by the presence of the tick which causes Texas fever. Owing to the danger of infection there is usually a quarantine against Southern cattle in Northern markets until late autumn,

which greatly reduces the profits to Southern stock raisers. In the blue grass districts of Kentucky and Tennessee blooded *horses* are raised, largely for saddle purposes, besides excellent *mules*. The principal market for race horses in the United States is Lexington, Ky., while Saint Louis, Mo., is probably the world's leading market for mules.

**North-Central Section.** In the northern part of the interior plain the several kinds of grain are grown more or less indiscriminately. South of Milwaukee, however, the principal crops are *corn* and *winter wheat*, which is sown in the fall and therefore needs a moderate winter. This is generally known as the corn belt. In the northern part of the section, the great crop is spring wheat, though good crops of barley and rye are also grown, rye especially on sandy soil. Oats are a common crop in all parts of this section. Owing chiefly to the grain fields of this region, the United States produces more corn and wheat than any other country. Corn is by far the leading crop, whether measured by acres or value.

In parts of Ohio and Southern Wisconsin the leading crop is *tobacco*. Farther north, *sugar beets* are increasingly grown, especially in Michigan and parts of Wisconsin. The sugar beet belt lies mostly north of the true corn belt, because beets require to be cultivated at the same time as corn. Another important crop in the same zone of mixed farming is field *beans*, which are harvested and threshed much like wheat. In the output of beans, Michigan holds first place. A third crop in this zone is *potatoes*. In Western Minnesota and the Dakotas, especially where the soil is new and strong, *flax* is extensively grown, as yet principally for the seeds, which are the source of linseed oil. This is valuable for use in paints, since it dries on exposure to the air. In all the states of the north-central region fruits such as *apples* and *plums* are grown for local use. Along the southern and eastern shore of the Great Lakes, which lessen the extremes of heat and cold, great quantities of fruit are grown for the market; this district has the largest output of fruit, next to California.

In the north-central section stock raising began with the early settlers, and by 1805 stock was being driven across the mountains to market. With the coming of the railroad in 1851, driving to market gave way to shipment by rail. As the railroads advanced westward, followed by the farmer, the herds could be driven on in search of fresh pastures. At the present time *sheep* are still of some importance in Ohio and Michigan, which were once the chief sheep-raising states, though mutton rather than wool is now the main product. The fact appears to be that rich land in this section has become too valuable to be used for grazing sheep; moreover, the killing of sheep by dogs seriously diminishes the profits.

*Hogs* are raised in enormous numbers in the corn belt, and likewise in connection with the dairy, being raised on skim milk and then fattened on corn. In this section corn is chiefly fed to stock and then marketed on the hoof, since it commands a higher price in the form of meat and is also condensed so as to save two-thirds of the freight. Moreover, live stock is of great value in maintaining the fertility of the soil. On the plains west of the agricultural zone, from Western Texas north to Montana, cattle and sheep are still raised on wild grasses and shipped into the corn belt to be fed. The grazing industry is thus quite distinct from the feeding industry. However, with the extension of crop growing westward, the area available for stock raising on the wild grasses has been greatly diminished. This is one reason for the rising price of meat in recent years.

While the production of meat animals has decreased, the dairy industry has made rapid progress, partly because the soil in the older states had been injured by constant cropping of grain. The leading dairy state in the north-central section is Wisconsin, which has now surpassed New York in the production of *cheese* and also is a large producer of *butter*. Minnesota is also coming to be known as a great "bread and butter" state. Dairying is the most promising industry in the states bordering the Great Lakes, since grass and roots flourish there better than grains. Another reason for the more rapid progress of dairying in Wisconsin and Minnesota is that the farmers there have organized coöperative creameries on the Danish model, whereas in some other sections the business is run by great private creameries which pay the farmer materially less a pound for butter fat than is paid where coöperative creameries prevail.

In the great plains east of the Rocky Mountains most of the rain falls in summer, owing to the drawing in of moist air from the south and east by the passage of areas of low pressure at that season. In recent years it has therefore been found possible to grow certain crops in this region without irrigation, such as Kafir corn (a kind of millet) and Durum wheat,

which has already become an article of export to Europe.

**Mountain States.** On the *Cordilleran highland* (see CORDILLERA) from the Rocky Mountains to the Sierra Nevada-Cascade range, the soil is usually fertile, and much of it is sufficiently level to be used for farming, but the rainfall over most of this immense region is insufficient. In the Southwest, indeed, there are some patches of true desert. In the Northwest, on the other hand, the lower temperature and stronger west winds cause a heavier rainfall. There, too, the Columbia River gap admits the moisture-laden winds to the plateau, helping to water the splendid wheat district around Spokane. There are also some other districts which have sufficient rainfall, but in general water must be brought to the land artificially or there will be no harvest. As a result, land alone is worthless, but water is almost priceless.

Owing in part to these climatic conditions, *stock raising* and mining have always been the leading industries on the Cordilleran highland. Originally cattle predominated, but in recent years *sheep raising* has become more and more prominent. This has injured the cattle raising industry, since sheep crop the grass so close to the roots that cattle cannot graze after them. Much of the land has thus been overgrazed, with the result that a good deal of it cannot now support as many head of live stock to the thousand acres as it could thirty years ago. The Cordilleran highland is, however, the principal wool growing section of the United States.

*Irrigation and Dry Farming.* In order to develop farming, private corporations first undertook to construct dams and irrigation ditches, naturally choosing the most favorable situations. Later the United States government made a grant of land to the states in aid of irrigation, and finally undertook directly the construction of irrigation works. It is estimated that eventually over fifty million acres of land may be irrigated in the valleys and at the foot of the mountains, where water may be delivered by gravity. There is also a possibility of pumping water from the rivers to some of the higher levels, but this plan is too expensive for general use. Such a development of irrigation will mean the creation in the midst of the desert of many densely-peopled farming communities. In 1917 about 14,000,000 acres were irrigated, not including rice fields, for which more than 14,000 pumping plants were required. The approximate acreage in each state, the number of farms served and the cost of construction appear in the following table; in the article IRRIGATION are descriptions of some of the greatest of the country's irrigation projects:

| STATE | FARMS | ACRES | COST |
|---|---|---|---|
| Arizona | 4,841 | 320,051 | $17,677,966 |
| California | 39,352 | 2,664,104 | 72,580,030 |
| Colorado | 25,857 | 2,792,032 | 56,636,443 |
| Idaho | 16,439 | 1,430,848 | 40,977,688 |
| Kansas | 1,006 | 37,479 | 1,365,563 |
| Montana | 8,970 | 1,679,084 | 22,970,958 |
| Nebraska | 1,852 | 255,950 | 7,798,310 |
| Nevada | 2,406 | 701,833 | 6,721,924 |
| New Mexico | 12,795 | 461,718 | 9,154,897 |
| North Dakota | 69 | 10,248 | 836,482 |
| Oklahoma | 137 | 4,388 | 47,200 |
| Oregon | 6,669 | 686,129 | 12,760,214 |
| South Dakota | 500 | 63,248 | 3,043,140 |
| Texas | 4,150 | 164,283 | 7,346,708 |
| Utah | 19,709 | 999,410 | 14,028,717 |
| Washington | 7,664 | 334,378 | 16,219,149 |
| Wyoming | 6,297 | 1,133,302 | 17,700,980 |

In addition to irrigation farming, it has been found possible in recent years to grow certain crops by a process known as dry farming (which see). West of the Rocky Mountains the rain, falling chiefly in winter, is absorbed into the soil without much evaporation, and over a large part of the area the surface soil is underlaid by clay, which is almost impervious to water. These two facts are taken advantage of to grow a crop every other year by keeping the surface covered during the intervening summer with a coating of finely-pulverized soil which checks evaporation and thus stores the rain of two winters in the soil. This plan makes it possible to grow wheat and some other staple crops with as little rain as ten to twelve inches a year.

The leading crops on the Cordilleran highland are *wheat* and *alfalfa*, a plant related to *clover*, which is grown for hay. Owing to the dry summer, the grain dries on the stalk so thoroughly that it can be cut, threshed and sacked by one machine, thus saving labor and leaving the stalks in the field to fertilize the soil. Vegetables are also grown, especially *potatoes* and *sugar beets* in Colorado.

**Pacific Slope.** On the Pacific slope agricultural conditions are much the same as in the Cordilleran section, except in the region of abundant rainfall around Puget Sound. The leading grain crops are *wheat*, in California, also *barley*, which takes the place of corn as a food for stock. *Sugar beets* and *lima beans* are also of considerable importance in Southern

California. Heavy freight charges on bulky commodities, however, have encouraged the production of special crops of small bulk; so in Oregon some of the best lands are occupied by *hop* yards, and in all parts of the Pacific slope outside the level valleys the farmers have largely turned their attention to fruit. In the total value of its fruit crop, California now ranks next to New York, producing not only temperate zone fruits, such as *peaches, apples* and *plums,* but also *grapes, raisins* and such tropical fruits as oranges, almonds and figs. *Nut* growing has also become a distinct industry, while the *date palm* has been successively introduced into the desert region of Southeastern California and Arizona. This tree requires an average temperature of 70°, with at least one month of 80°.

The drier the air the better the date palm thrives, but the roots must have ample moisture; it is thus most at home in the desert oasis. The principal *orange* district is in Southern California especially in the seaward slope of the coast range, where the mountains run east and west. This has become one of the greatest orange-producing districts in the world.

Just above the head of the Gulf of California is a low-lying region called the Imperial Valley. This was at one time a part of the Gulf, but was cut off from it by the sediment deposited by the Colorado River and then filled up with layers of the same sediment, though part of it, known as the Salton Sea (which see), is still considerably below sea level. This district can be irrigated readily from the Colorado River and resembles Egypt closely, both in climate and soil. It seems likely, therefore, that it can be made a great producer of *Egyptian cotton,* which is of better quality than the ordinary cotton grown in the south. (See EGYPT, subhead *Agriculture.*) This district also offers many other opportunities for irrigation agriculture.

## *Development of Manufacturing Industries*

Manufactures were originally, as the word implies, made by hand, and for the most part in the homes of the people. During the colonial period in the English colonies, clothing was spun and woven at home, and most of the industries were carried on either in the home or in small shops in the immediate neighborhood. This condition lasted after the Revolutionary War down to the War of 1812. During the latter war the blockade of the American coast by the British, together with the Embargo Act, seriously diminished American shipping on the ocean, and it also greatly increased the cost of manufactured goods imported into the country. These two conditions led to the rapid development of establishments using power machinery rather than hand tools, and this movement was still further stimulated after the close of the War of Secession by high taxes on imported goods (see PROTECTION).

At first, water power was chiefly employed, and for this reason the new factories were built along the rivers where such power was immediately available. Since the rivers in New England descend from considerable elevations and go through various lakes which tend to render the flow fairly steady, and also because the people there were very energetic, the early factories were largely built in that section of the country. As time went on, however, steam began to be more extensively used, until the power furnished by steam far exceeded that derived from water. With the use of steam, it became advantageous to build factories either near the coal fields or where coal could be delivered from the mines very cheaply, as along the sea coast. Steam thus gave rise to a new class of manufacturing towns. Since coal was abundant in Pennsylvania and farther south, but was lacking in New England, the use of steam greatly stimulated the development of manufactures in the states along the Middle Atlantic coast.

Since about 1900 two new factors have entered the problem. On the one hand, electricity is being more and more used to drive machinery; this is partly derived from water power and partly from steam engines. Compared with the old water wheels, it has the advantage that the electric current may be generated in the mountains and carried by wire down to the plains for use at central factories; or the current may be generated at one huge central power plant and then distributed to a large number of different factories (see KEOKUK DAM). It is also possible to run part of a factory by electricity without using enough power to run the whole of the machinery. For these reasons factories are growing up rapidly in districts where electricity derived from water power is readily available; for example, around Niagara Falls.

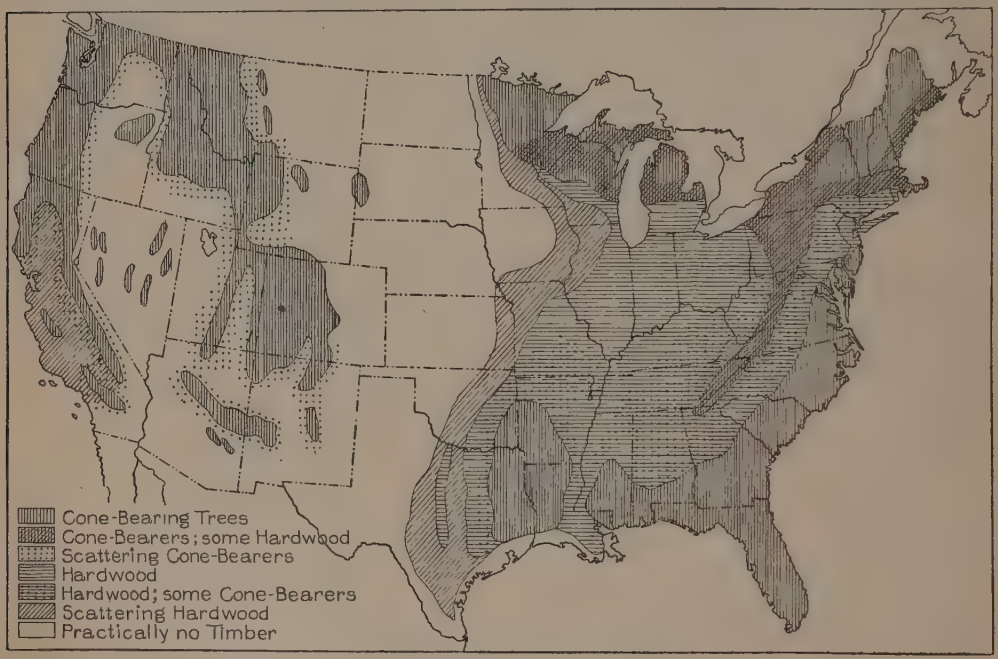
The second new factor in the power problem is the gas engine. This is familiar in the auto-

mobile, consisting of a cylinder in which a mixture of gas and air is exploded by an electric spark. Besides gasoline, either natural or manufactured gas may be used; kerosene power is developing; and various other mixtures are also coming into vogue. Already the gas engine is beginning to play an important part in manufactures. Both electric power and gas engines seem to give the small shop a better chance to compete with the large shop than it had when steam or direct water power were employed.

Besides power, several other considerations influence the location of manufactories. For one thing, it is advantageous to have a factory located as near as possible to the source of raw material, especially if the raw material is bulky and therefore expensive to transport. Again, certain articles such as wagons and agricultural implements are expensive to ship long distances because of their bulk, even though not very heavy. In the case of such goods, it is best to have them made as near as possible to the regions where they are to be used, especially if the raw materials, wood and iron, are obtainable in the same district. Further, it is sometimes cheaper to ship raw materials to the coal than the coal to the raw materials, particularly if the value per ton is greater. An example of this situation is afforded by the iron and steel industry.

Finally, the higher kinds of manufacture call for a larger amount of skilled labor in proportion to the cost of the raw materials. Whenever this is the case, it becomes advantageous to ship the raw materials to places where such skilled labor is to be had, and these places are usually in the more densely populated parts of the country. For this reason the higher classes of manufactured goods are often made in the eastern section of the United States, notwithstanding the raw materials are often produced in the western.

**Lumbering and Wood Products.** The combination along the North Atlantic coast of timber, rivers to float the logs, water power to saw them, and excellent harbors early led to an important lumbering and shipbuilding industry in that section, especially in New England. Lumber has remained an important product and to it has been added more recently the manufacture of paper, which is made largely from wood pulp, though some of the finer grades are made from linen rags. With the settlement of the states around the Great Lakes, the manufacture of lumber products developed rapidly in that section. More recently the forests of the South and of the Pacific coast have been drawn upon after the forests in the older districts began to show signs of approaching exhaustion.




FOREST AREAS OF THE REPUBLIC

Furniture made chiefly of hard woods is extensively manufactured in the states bordering the Great Lakes, notably at Grand Rapids, Mich., until about 1900 the world's greatest furniture manufacturing city. New York and Chicago new excel it. The manufacture of agricultural implements and road vehicles is also dependent on the hardwood forests, as well as on iron. The center of the agricultural implement industry is at Chicago; Cincinnati is important in the manufacture of horse vehicles; and Detroit is the most important city in the world in the manufacture of automobiles.

**Foodstuffs and Beverages.** The preparation of foodstuffs for use, which was originally a household task, has also been taken over in large part by factories. Flour mills were found in all of the colonies and in all of the states at an early date, being run in part by water and in part by wind power. After the opening of the Erie Canal in 1825, Rochester, N. Y., became the great flour-milling center. As population spread westward other centers developed, notably Minneapolis, which eventually became the greatest milling city in the world. The industry is now very widely distributed.

Meat packing began in the United States at Cincinnati, about 1818. With the use since 1868, and especially since about 1880, of refrigeration to chill fresh meat, the packing industry has moved toward the cattle pastures and corn fields. It is now concentrated in comparatively few establishments, the most important centers of meat packing being Chicago, Saint Louis, Kansas City and Fort Worth.

Another industry of large proportion is the manufacture of alcoholic liquor. Beer is made in nearly all of the centers of population, Milwaukee and Saint Louis being especially prominent in this industry. The distilling of whisky and other strong liquors, on the other hand, was concentrated in relatively few cities in the heart of the corn belt, chiefly Peoria, Ill., and Terre Haute, Ind., until September, 1917, when its manufacture was stopped by law. The amount of internal revenue collected upon the manufacture of whisky in the Peoria district alone during the years the Panama Canal was building was as much as the total cost of that vast enterprise.

The canning of fruit, vegetables, fish and oysters has developed into an immense industry. Oyster canning is carried on especially at Baltimore and at Wilmington, Del.; fruit and vegetables are canned in various districts in the Middle and North-Central states, as well as on the Pacific slope. Along the Pacific shore there are important salmon canneries on the coast of Alaska. The refining of raw sugar is concentrated largely in the seaports, where the cargoes of sugar are landed, especially at Brooklyn, New Orleans and San Francisco. Several of these also employ local supplies of cane and beet sugar.

**Leather Industries.** The oak and hemlock forests of New England furnish tan bark, which early led to the tanning of leather. This is still carried on in Massachusetts, but in the main the tanning industry has followed the retreating forests to the West and the South. This migration has apparently been stopped, in part at least, by the use of chemical tannage at Philadelphia. Other important tanning centers in the Middle Atlantic states are Newark, N. J., and Wilmington, Del. Leather tanning has also developed extensively in the Central West, especially at Milwaukee, which obtains tan bark from the hemlock forests of Wisconsin and hides from meat-packing establishments. Both in Milwaukee and Chicago much of the leather is used in making boots and shoes, and next in consumption is the demand for bookbindings. Massachusetts has by far the largest output of shoes, especially at Lynn, Brockton, and Haverhill. In the Middle states, New York City and Rochester are of great importance, while in the West Saint Louis holds first rank.

**Textile Industries.** Cotton and woolen mills were first established on rivers furnishing water power, and they are still largely found in such locations. The North Atlantic section has by far the largest output of cotton and woolen goods; Fall River, Mass., is perhaps the leading cotton manufacturing city, while Lowell, in the same state, holds first place in woolen goods, and the Philadelphia district in carpets. Silk manufactories center at Paterson, N. J., at the falls of the Passaic River, adjacent to New York City, where most of the raw silk is imported; the silk industry has also spread to neighboring cities, as far as Philadelphia. Outside of the North Atlantic district cotton mills have been established in many parts of the South, especially along the fall line, where there is advantage both of raw material near at hand and of water power. North Carolina and South Carolina rank next to Massachusetts in the manufacture of cotton goods. Woolen manufactures are more widely distributed, being found in various north-central sections and also in the West. Somewhat allied to the textile

industry is the manufacture of rubber goods, since these have, in fact, the same uses. Such goods being made of imported materials, they are manufactured chiefly in tidewater cities, where the raw material is landed, although some important rubber mills have also been established in the interior, notably at Akron, Ohio, which is the greatest consumer of crude rubber in America.

**Clay and Sand Products.** Manufactures using minerals began in the United States with the making of brick, although the earliest houses were built with bricks imported from England. The manufacture of brick and tile has now developed into a vast industry, distributed throughout almost the entire country. Five states, however, produce more than half of the clay products, as measured by value; in the order of their importance these are Ohio, Pennsylvania, New Jersey, Illinois and New York. One of the chief factors in the great development of clay manufactures in these states has been the presence of abundant cheap coal in the immediate vicinity. Somewhat similar in character are the manufactures of glass and cement, which are carried on in substantially the same regions. Glass, however, being made largely with natural gas, has become an important industry in the Indiana and Ohio gas fields. Cement is produced at various points farther west.

**Other Mineral Manufactures.** Metal manufactures in the United States began with the erection of iron furnaces using charcoal, some of these being built in New Jersey as early as 1710. The iron industry, however, attained real importance only after the War of 1812. About 1840 charcoal gave way to anthracite coal as fuel, which resulted in building up a group of iron manufacturing towns in Eastern Pennsylvania. Since about 1875 coke made from bituminous coal has superseded anthracite as fuel in smelting iron; in consequence of this substitution the center of the iron manufacturing industry is now at Pittsburgh and other towns in the bituminous region, extending as far west as Chicago and as far south as West Virginia. The Chicago field, centered at Gary, Ind., bids fair to outrank all other steel centers. Other iron manufacturing districts have developed in Northern Alabama, around Birmingham, and also in the western section, notably at Pueblo, Colo. At present the iron ore from the Lake Superior region is shipped down the lakes, meeting the coke from the Pennsylvania fields along the southern edge of the Great Lakes, and in some cases at towns some distance inland from the lakes. Recently, however, a modern steel plant has been established in Duluth, which indicates a tendency to ship the coke to the ore. That this change has not been generally made as yet may be explained by the fact that after the ore is smelted the market for the iron is found more largely in the East than in the West.

Petroleum, although used to some extent in its crude condition as fuel, is largely refined, yielding gasoline, kerosene and a long list of other products. The business of refining oil is largely controlled by one gigantic corporation, the Standard Oil Company, which has pipe lines from the principal oil-producing districts to tidewater, where the most important refineries are located. There are, however, some large refineries in the interior of the country, notably at Whiting, Ind., a few miles from Chicago, which serve the adjacent region.

Copper, zinc and lead are usually smelted in the vicinity where mined, although some of the ores are merely concentrated and then sent on to the larger centers for final treatment. Aluminum, which is used for many purposes in place of brass and also in place of copper for long distance transmission, is smelted chiefly in electric furnaces. The district around Niagara is therefore an important source of aluminum.

## *Transportation and Commerce*

Not many generations have passed since nearly everything was produced on the premises where it was consumed; to-day few people consume any considerable part of what they produce. For the most part, every one aims to produce what he thinks he can sell for a good price and depends upon buying in the market what he wants to eat, wear and use in his home. This change in conditions of life is largely the result of improved transportation, which enables each class of people and each section of the country, or indeed, of the world, to produce one article or class of articles and obtain in exchange whatever else may be needed.

**Westward Trend by Trails.** Since the earliest colonists in the United States came from over the sea, they naturally settled first on sheltered bays along the Atlantic seaboard, and as population increased they pushed inland along the rivers. At the head of canoe navi-

gation on the rivers, the English were forced to abandon water transportation and to strike into the dense forests, following at first the Indian trails and the paths of wild animals. The Mohegan Indian path, which Washington followed on his mission to the French in 1754, became later the route of the Baltimore & Ohio Railroad. In like manner Indian paths and early highways marked out the routes from Philadelphia to Pittsburgh, from Albany to Lake Erie, and from the Shenandoah Valley through Cumberland Gap to the falls of the Ohio at Louisville. The latter path was followed by Daniel Boone in 1769, and it was over this route that Kentucky was settled.

These rough trails, however, were insufficient to unite remote sections in a community of interest or feeling. It was therefore evident, even before the close of the American Revolution, that the future of the country depended upon overcoming the barrier of the Appalachian Mountains. This was accomplished first by the construction of the National Road from the Potomac through to the Ohio River in 1818, and especially by the opening in 1825 of the Erie Canal, which connects the navigable Hudson with the Great Lakes. These became the first bonds of union between the East and the West.

The work of unification was powerfully furthered by the steamboat, which first appeared on the Ohio in 1811, but was not perfected so that it could navigate against the current with certainty until 1818. For more than a generation the commerce of the United States was carried chiefly by river, lake and canal. The first railroad in the United States, the Baltimore & Ohio, was begun on the 4th of July, 1828, but for many years railroads were regarded merely as feeders of the waterways and as connecting links between them. The first continuous line of railroad, beginning at tidewater on the Atlantic, reached Buffalo in 1842; the Ohio River, in 1851; Chicago, in 1852; the Mississippi River, at Rock Island, in 1854; the Missouri, at Saint Joseph, in 1859; and the Pacific Ocean, at San Francisco, in 1869. Meantime, in 1859, the first railroad had also been opened from the Gulf of Mexico to the Great Lakes—the Illinois Central. The driving of the last spike on the Union Pacific marked at once the political unification of the United States and the commercial conquest of the continent.

**Transportation in New England.** The broken coast line of New England renders it by nature the most maritime section of the country, yet it labors under serious handicaps in foreign commerce, which have only been overcome by great energy and perseverance. In the first place, its ports lie farther from the interior than Baltimore or New York; again, it is shut off from the interior by the Berkshire Hills, which compels a climb of a thousand feet and therefore increase the cost of transportation; finally, the trend of the valleys of New England is toward the Saint Lawrence River, but the political frontier largely closes to the commerce of the United States this natural route to the interior of the continent. All of these natural disadvantages, however, are in a measure offset, so far as foreign commerce is concerned, by the fact that the railways make the same rate to Boston as to New York on shipments from the West for export to other countries.

An eight-mile sea-level ship canal has also been constructed between Cape Cod Bay and Buzzard's Bay to avoid the long and dangerous route around Cape Cod (see Cape Cod Canal). This Cape Cod Canal may render Boston a port of call for some of the vessels plying between Europe and New York. The completion of the bridge across the Saint Lawrence to Quebec will also naturally tend to bring Portland, Maine, into closer relations with the region north of the Saint Lawrence and east of Montreal, so far at least as the political boundary does not interfere. New England is now traversed not only by a net of steam railroads but also by another series of electric lines, which have made almost all parts of it much like the suburbs of a great city.

**In the Middle Atlantic Section.** In the Middle Atlantic states canals were early built up the Delaware, Schuylkill, Susquehanna and Potomac valleys and also across the watershed between the Delaware and the Hudson rivers. The main service of these canals has been to carry coal from the mines to tidewater and to New York. However, these canals have either been abandoned or have passed under the control of the coal-carrying railroads and are therefore of little practical importance. Nevertheless, it seems likely that if the Delaware and Raritan Canal should be deepened to fourteen feet, it would become a large factor in the coal trade of New York and New England. New York, unlike Pennsylvania, has retained control of its canals which connect the Hudson with the Great Lakes at Oswego and at Buffalo, while another canal goes north from the Hudson to the Saint Lawrence by way of Lake Champlain. These canals have been toll free

since 1882 and are being deepened to twelve feet at a cost of more than $100,000,000, that they may carry 1,500-ton barges. This expense was undertaken in the hope of meeting the competition of the Saint Lawrence route by reducing the cost of transportation between Buffalo and New York to about twenty-five cents per ton. Finally, a coastwise canal connects the Chesapeake and Delaware, and this is likely to be replaced in the near future by a sea level ship canal. Besides saving distance, the building of such a canal would tend to make Philadelphia a port of call on the northern route from Baltimore to Europe.

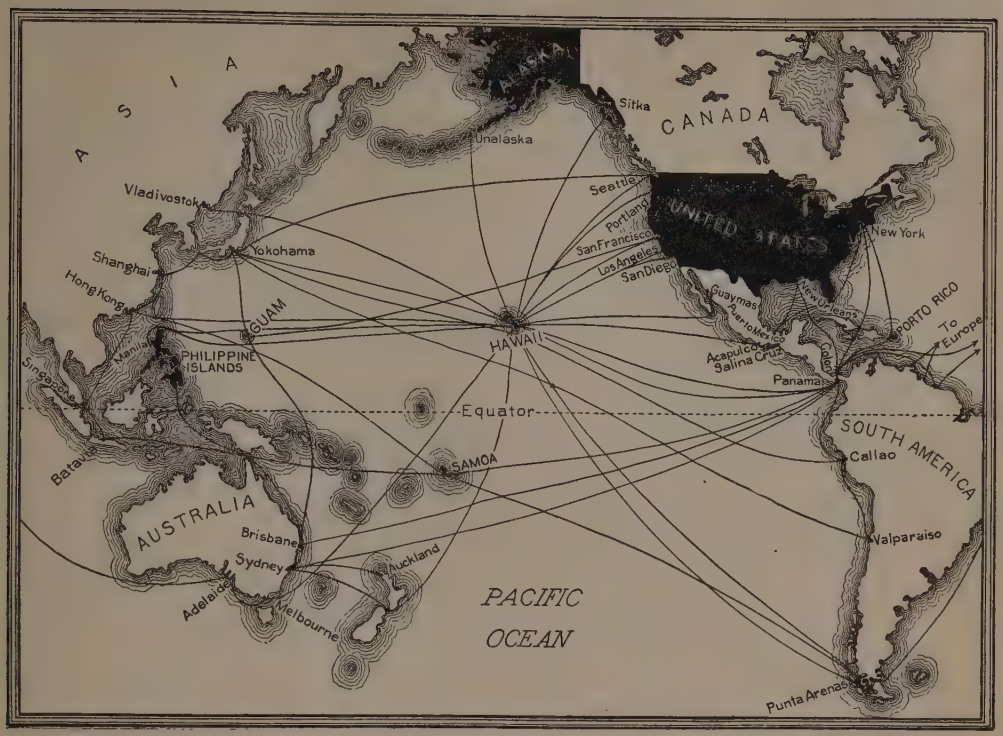
Transportation by sea costs on the average not more than one-tenth as much as transportation by land. For this reason the great commercial centers are found, not at the ends of peninsulas but at the ends of bays, from which the transportation by land will be as short as possible. Accordingly, along the North Atlantic coast the ports marked out by nature as the centers of sea-borne commerce are Boston, New York, Philadelphia and Baltimore, precisely the places which actually have become important seaports. New York not only has a superb harbor, but by reason of the navigable Hudson and the Mohawk Gap leading westward from Albany through the mountains it also enjoys unequaled ease of access to the interior. This situation has made it the metropolis of the continent, as well as the greatest commercial seaport in the world. In addition to the Mohawk Gap, the rivers offer other fairly-easy routes to the interior of the continent.

Even with dynamite at their disposal railways rarely penetrate mountains except along pathways prepared by running water. Thus the Potomac River furnishes the route of the Baltimore & Ohio Railway, which follows, in part, the very trail used by Washington; the Juniata branch of the Susquehanna is closely followed by the Pennsylvania railroad; while the north and west branches of the Susquehanna, together with the Delaware, furnish the routes for the Erie, the Lehigh Valley, the Lackawanna and the Ontario & Western railroads. The Great Lakes' route terminates at Buffalo on the east, as it does at Chicago and Duluth on the west; and all the railroads crossing the mountains strike either the Great Lakes or the Upper Ohio. Buffalo and Pittsburgh are thus the two northern gateways of the west.

**In the South-Atlantic Section.** The Appalachians rear a higher and more continuous front south of the Potomac than north of it; in this section they are crossed by only four railroads in five hundred miles; these, moreover, have difficult grades. The two slopes of the Appalachians therefore face commercially in opposite directions. On the Atlantic slope, one trunk line of railroad, roughly parallel with the coast, traverses the plain below the fall line, and another skirts the Blue Ridge, which offers another, though more difficult, route to New Orleans. Three of the railroads crossing the Blue Ridge converge at the James River. Newport News and Norfolk are, therefore, not only the commercial outlets of Virginia and North Carolina, but also of Cincinnati and Louisville. They are especially important in the coal trade. The fourth railroad across the Appalachians, following the French Broad River, connects Knoxville and Charleston. Atlanta, opposite the first easy passage from the coast to the Great Valley, is well named the "Gate City of the South." Knoxville and Chattanooga, in the Great Valley, are in turn the local points of other railroads from the West and North which enter by the Tennessee water gap at Chattanooga and other depressions in the mountain rim.

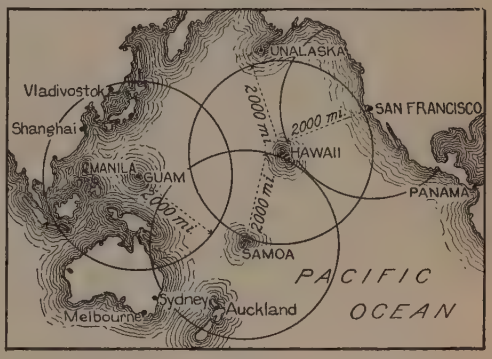
South of Chesapeake Bay the land along the shore is low and straight, while the coast is lined with sand bars. The river mouths, which have been drowned by a slight sinking of the land, form the only harbors, and these need frequent dredging to admit large vessels. Conditions are therefore not favorable for water transportation, and many of the principal towns are found along the fall line at the inner margin of the coastal plain. In the region south of Cape Hatteras the principal seaport is Savannah, located where the broad curve of the shore brings the ocean nearest to the interior.

**In the South-Central Section.** Thomas Jefferson declared any foreign nation controlling the mouth of the Mississippi River would be "the natural and necessary enemy of the United States," since it is the natural outlet by water of nearly half of the country. The lower Mississippi, ice free and of ample depth, is still a great highway of commerce, in spite of a veritable network of railroads. Its tributaries, penetrating the coal fields, are also important, especially the Tennessee, which is now navigable to Knoxville. After the War of Secession, however, the eastward trend of traffic by rail to the North tended to rob even the Mississippi of its old-time importance and therefore to divert traffic from the Gulf ports. Nevertheless, the Mississippi Valley offers a level field




UNITED STATES' CONTROL OF THE PACIFIC OCEAN

In the upper map the trade routes on the Pacific are shown. The smaller map shows graphically how the United States navy could defend Pacific waters from its bases in that ocean.




for railroad construction and is therefore the line of least resistance from the south-central region to tidewater. In recent years the traffic of all the Gulf ports has increased with great rapidity.

New Orleans, commanding the southern gateway of the continent, is naturally the metropolis of the South and the second seaport of the United States, measured by its exports and imports. Galveston, lying at the head of the Gulf of Mexico, has become by virtue of this location the commercial outlet of Texas and of the Southern states, as far as Denver, and is the greatest cotton-exporting city in the world. In like manner Mobile and Pensacola are the commercial ports of the coal and iron district about Birmingham, and of the Mississippi Valley as far north as Cincinnati. Mobile, in fact, occupies much the same position in the eastern as Galveston does in the western part of the Gulf. Key West is built on a coral island lying far out at sea, but this has now been linked to the mainland by a wonderful railroad built on long, concrete arches in the open sea (see page 2216). From Key West train ferries can readily carry freight and passengers to Havana without transshipment. It is believed that Key West will therefore become an important mail and passenger port for trade with Cuba and perhaps with the other West India Islands. It is the most southerly city of the United States for trade with the West Indies, Central America and the Panama Canal.

A bridge across a great river draws traffic as surely as does a gap in the mountains, especially if the distance is long between bridges. For this reason Memphis, built on a bluff which furnished a convenient abutment for the southernmost bridge, has become a great railroad and commercial center. Other points where railroads converge are Louisville, at the falls of

the Ohio, which forms one gateway toward the North, and El Paso, at the gap cut by the Rio Grande in the Rocky Mountains, which is the southern route toward the Pacific.

Now that the Panama Canal is completed, new life has naturally been given to Southern industries and commerce; this influence is going to be felt by every city on the Mississippi, from Minneapolis to the Gulf. Much commerce that now goes east and west will go south, and still more commerce will be created by the fact of cheap transportation to the west coast and to the Orient. New Orleans will surely lie on one of the main world thoroughfares. Moreover, the expanding trade between the United States and South America adds largely to the tonnage through the Canal and the Mississippi.

**In the North-Central Section.** Thomas Jefferson in 1803 thought it would be a thousand years before the Mississippi Valley, or even that portion of it east of the river, could be fully settled. The short time required to populate this section was the result of rivers and lakes which formed highways into the wilderness, of the level surface which favored equally land and water transportation, and, above all, of steam.

The early development of this district was principally due to the extensive natural waterways, but in the last twenty or thirty years the influence of most of these has greatly declined. On the upper Mississippi there are still some rafts of logs, though few compared to a few years ago, and the Ohio carries great fleets of barges loaded with coal. On the other hand, the Missouri, having no commodity to transport which cannot as well go by rail, has long been practically deserted.

Canals were early built connecting the Mississippi River with the Great Lakes, along three routes, following the portages of the early French explorers and fur traders; these are (1) between the Wisconsin and Fox rivers at Portage, Wisconsin; (2) between the Illinois and Chicago rivers; and (3) between the Ohio River and Lake Erie at Toledo and Cleveland. Another canal lately completed connects the Illinois River with the Mississippi at Rock Island (see Illinois and Michigan Canal; Hennepin Canal). Most of these canals, however, will have to be either deepened or abandoned, as their depth (four to seven feet) is insufficient to compete with railways. The state of Ohio has already begun to deepen the canal from Cleveland toward the Ohio to twelve feet, but it is doubtful whether even this depth is adequate. The Chicago Sanitary and Ship Canal, having a depth of twenty-two feet, was constructed of this size as the beginning of a deep-water connection between the Great Lakes and the Gulf of Mexico, popularly referred to as the Lakes-to-the-Gulf Waterway. Whether a twenty-two-foot canal could be constructed all the way to the Gulf may be doubted, but the deepening of the Mississippi and Illinois rivers so as to afford a fourteen-foot channel has already become a practical public question.

The Great Lakes, however, are by far the most important factors in the commerce of this region, forming a superb waterway extending over a thousand miles into the very heart of the continent, and bearing in a year about one-third as much freight as all the railways in the United States, at about one-tenth the cost, though this advantage is somewhat reduced by the expense of transshipping cargoes to and from the lake vessels. For years the average freight rate per ton per mile on the Great Lakes was .81 mill, while the average rate by rail was 7.8 mills; both rates are now somewhat higher. A single vessel has carried from Duluth to Buffalo 422,000 bushels of grain, equivalent to fourteen bushels to the acre from about fifty square miles of wheat fields. The Sault Sainte Marie Canal, connecting lakes Superior and Huron, carries a tonnage several times greater than the Suez Canal. Cargoes go in bulk, unbroken, from Duluth to Buffalo. By using the new Welland Canal or the enlarged Erie Canal they may even reach the sea, although the size of these canals does not permit them to carry the larger lake vessels.

The level surface and relatively dense population of the interior plain have caused it to be covered with a closely-meshed net of railways, especially in the region south of the Great Lakes. The greatest railway center in this section is naturally Chicago, which is likewise the world's greatest railroad center, for one-sixth of the world's mileage centers there. That city lies at the southwestern end of the Great Lakes' route, where all railroads from the West and Northwest necessarily converge in order to pass around Lake Michigan. This location is the one great advantage possessed by Chicago over Milwaukee. Duluth and Superior at the northwest end of the Great Lakes' route, occupy a somewhat similar location, and but for the Canadian boundary, which turns trade from its natural channels, might almost rival Chicago.

Canada extends nearly as far south as the latitude of Chicago, but the Great Lakes prevent entrance to it from the west, except in three places. The Sault Sainte Marie bridge forms the connecting link between the United States and Montreal, while the narrow waters between lakes Huron and Erie are tunneled at Port Huron for a line from Chicago to Toronto, and at Detroit for a line from Chicago to Buffalo.

Most of the cities in the northern Mississippi Valley were located with reference to river transportation. Thus, Saint Louis was placed by Laclede in 1764 as a center for the fur trade, the site chosen being a commanding bluff near the mouths of the Illinois and Missouri rivers. This location has made Saint Louis a great commercial center, both by river and by railroad. Cincinnati occupies a somewhat similar position with reference to the Ohio and its tributaries. Saint Louis and Cincinnati, together with Louisville, are the principal commercial centers toward the South. In like manner, Kansas City and Omaha developed at the convergence of river valleys, notwithstanding some of the rivers are not navigable, since these valleys afford easy routes for railways. The "Twin Cities," Minneapolis and Saint Paul, grew up, the one because of water power, the other at the head of ordinary navigation on the Mississippi. These cities on the Mississippi and Missouri are the gateways toward the West, since to each of these the railways converge and from each they again diverge into the territory beyond.

**In the West.** In the western portion of the United States, which is in the main a lofty table-land, there are few inland waterways. The rivers entering San Francisco Bay are navigable for some distance; below Stockton and Sacramento they carry considerable traffic, in spite of sand banks due to hydraulic mining (see subhead *Metals,* above). The one waterway of real importance, however, is the Columbia River. This is navigable by seagoing vessels to Portland, and by river boats to Lewiston, except for one break at The Dalles, where a canal rounds the rapids. The railways in the West are consequently masters of the transportation situation. Moreover, railways there are unavoidably expensive to build and to operate, because of the rugged surface and the great elevation of the mountain passes. The lowest summit level is about double the highest elevation on any railroad crossing the Appalachians. The result of these conditions is high freight rates, which serve to limit many industries.

Denver, the one great city of the Western plains, was at first merely an outfitting station for mining camps, but has now become the principal railway center adjacent to the Rocky Mountain region. On the high plateau between the Rockies and the Sierras the principal commercial center is Salt Lake City, reached from the East by several railways, while from it other lines radiate to Butte, Portland, San Francisco and Los Angeles. Spokane holds a somewhat similar position in the Upper Columbia basin.

On the Pacific slope, the coast line is singularly straight and unbroken, and good harbors are few. West of the coast range are San Diego, on a small but safe harbor; Eureka, on Humboldt Bay, adjacent to the principal redwood district; and San Pedro, or Port Los Angeles, an artificial harbor called from the city of that name. Los Angeles itself is an inland city opposite the San Bernardino Pass, which leads over into the Imperial Valley, and this in turn forms a natural route toward the Gulf of Mexico. From Los Angeles three railroads extend to San Francisco, one along the sea and two through the great San Joaquin Valley.

The coast range is pierced by waterways at only three places in the United States—at the Golden Gate, the Columbia River and Puget Sound. San Francisco, located on the Golden Gate, has a harbor larger and more easily accessible than the harbor of New York. It is the second greatest city of the Pacific Coast; and now that the Panama Canal is open, it is also likely to become a port of call on the northern route from the Panama Canal to Japan. Portland is a river port, like New Orleans, and now that the troublesome bar at the mouth of the Columbia has been removed by jetties, Portland will no doubt play a somewhat similar part in commerce (see JETTY). It has the great advantage that the Columbia, unlike the Mississippi, runs with, and not across, the general course of commerce, and it is already an important grain and lumber port. It is reached by railroads from San Francisco and Puget Sound, while from the east branches of the Northern Pacific and Great Northern descend the Columbia Valley. The spacious and secure harbors on Puget Sound, however, are the chief rivals of San Francisco for Oriental commerce. On Puget Sound are the terminals of the three northern transcontinental railroads. These ports are favored by their location, in that they stand opposite the lowest, narrowest and

least sterile part of the Cordilleran highland. They also profit most from the development of Alaska, and the shape of the earth is in their favor, bringing China and Japan nearer to Puget Sound than to ports farther south.

In Alaska the mountain ranges of the Cordilleran highland swing around so as to run substantially east and west, and the great plateau between the principal ranges is drained to the westward by the Yukon, a river larger, but shorter, than the Mississippi. This forms the principal transportation route into the interior. In the southwest a railway only 112 miles long, running chiefly through Canadian territory, crosses the mountains at an elevation of 2,880 feet, from Skagway to the head of navigation on the Yukon. In 1914 Congress authorized the President of the United States to construct at public expense a thousand miles of railway to open up the Alaskan coal fields and connect the southern coast with the Yukon region through United States territory (see page 140). Several short private railways have already been constructed on the south coast and others in the interior and in the Nome peninsula.

In addition to Skagway the principal commercial centers are Saint Michael, near the mouth of the Yukon River, and Nome, upon an exposed beach where goods and passengers must be landed through the surf at heavy cost (see page 4245). Both Bering Sea and the Yukon River are, as a rule, icebound from September until June. During that period, dog sleds are used to some extent.

**Foreign Commerce.** The foreign commerce of any country depends upon the natural resources which it possesses and upon the intelligence and industry of its inhabitants. Perhaps no other area of the same size in the world equals the United States in respect to fertile soil, abundant minerals, navigable waters, excellent harbors and healthful climate; and no other nation of the first rank except Russia fronts on the two greatest oceans or their arms. Moreover, the people of the United States are active and adventurous, by right of inheritance, for only those of such a disposition were willing in the early days to brave the uncertainties of the New World. These qualities have been further reënforced by frontier life, which necessarily breeds inventiveness and self-reliance. Finally, self-government has powerfully promoted general education and intelligence.

All new countries first exploit the crude resources of sea, forest, farm and mine, since they must have food and raw materials before they can undertake manufactures. The United States first entered foreign markets as an exporter of fish and timber from the North Atlantic section, tobacco and cotton from the South Atlantic, grain and animal products from the Mississippi Valley. The area of largest production has shifted westward with the increase of population. Comparing the present with the past, it is evident that a great change in the character of the commerce has set in. With the increase of population in the United States the surplus of foodstuffs, lumber and other crude products available has materially decreased. In fact, the United States is becoming more and more dependent upon Canada for timber, while meat, eggs and even grain have recently been imported, especially from Argentina.

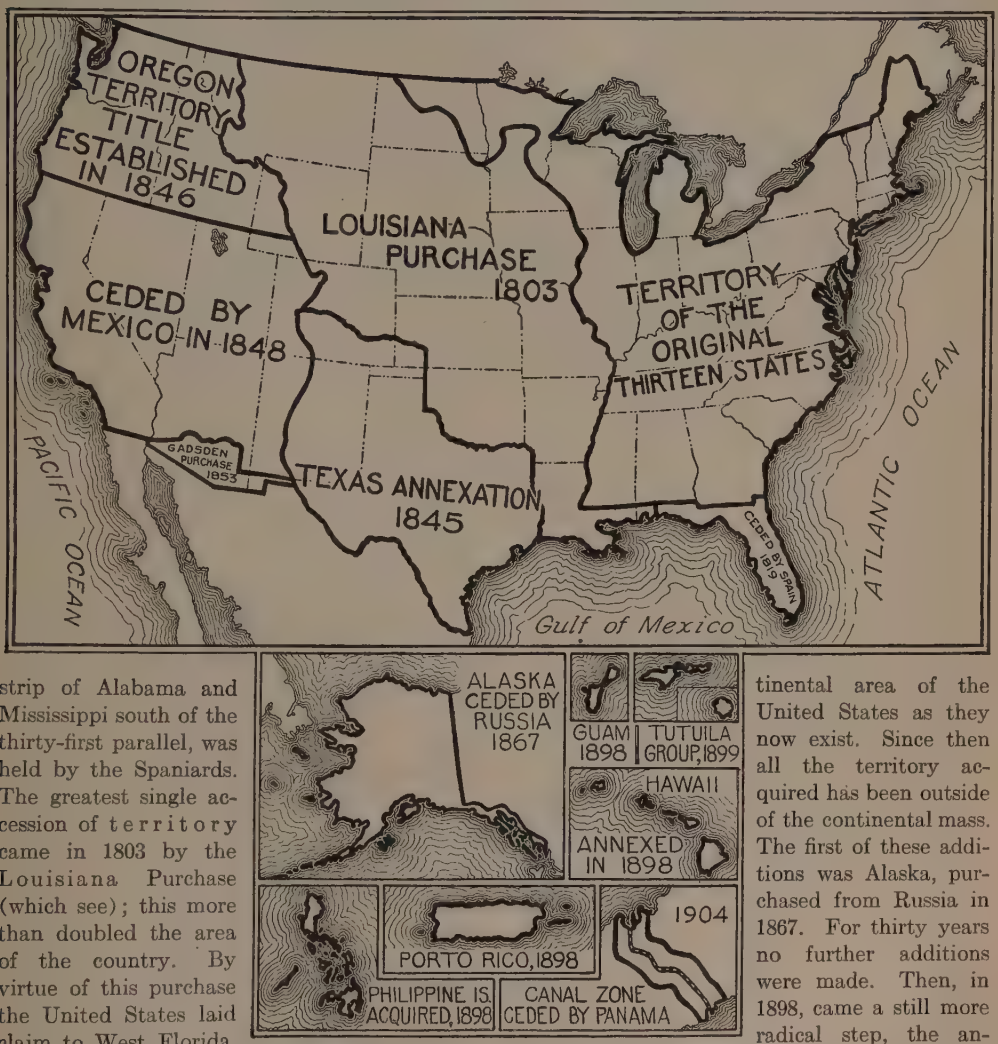
In place of exporting foodstuffs and other raw products, the United States is more and more using these at home, and then exporting manufactured products which have a larger value and smaller bulk. Compared with Europe as a whole, which forms almost an equivalent area, the United States is still in the early stage of manufacturing development; but compared with any other part of the world it has made great progress, and is by some rated as the first manufacturing country on the globe. This became undeniably true when the War of the Nations in 1914 broke upon Europe and called its man power into the armies. Such supremacy as Europe had previously maintained in manufacturing was due to abundant supplies of skilled labor, long experience and superior educational training for industry and commerce.

The future commerce of the United States will consist less in the exporting of foodstuffs and raw materials, as in the past, and more in the export of manufactures. For some time the largest share of the foreign commerce of the United States will be with Europe, but markets for manufactured goods are to be sought not in Europe, which buys chiefly foodstuffs and raw materials, but rather in the outlying possessions of the United States, and in Canada, Mexico, South America, South Africa, the Orient and the countries around the eastern end of the Mediterranean Sea, which buy largely manufactured goods. It is in these same countries, moreover, that have been slow to develop and have little accumulated capital, where much American capital has been invested, and where still greater investments may be expected in the future. These are consequently the portions of the world having the greatest interest for the United States.

## *Growth in Area and in Population*

**Territorial Expansion.** At the close of the Revolutionary War the United States comprised all of the territory within the present boundaries east of the Mississippi, except Florida; the total area of the country was 827,844 square miles. Florida, which then included the whole of the present state and a small strip of Alabama and Mississippi south of the thirty-first parallel, was held by the Spaniards. The greatest single accession of territory came in 1803 by the Louisiana Purchase (which see); this more than doubled the area of the country. By virtue of this purchase the United States laid claim to West Florida, held by Spain, and troops actually occupied the section during the War of 1812. The dispute was settled in 1819 when the United States purchased the whole of Florida from Spain. In 1845 the annexation and admission of Texas added nearly 400,000 square miles, and the Mexican War added a still larger area (see page 3764).

Meanwhile, in 1846, the surrender of the British claims to the Oregon country gave the United States 288,000 square miles of additional territory. A few years later the United States bought from Mexico a small strip known as the Gadsden Purchase (see page 2358). This purchase established the boundaries of the continental area of the United States as they now exist. Since then all the territory acquired has been outside of the continental mass. The first of these additions was Alaska, purchased from Russia in 1867. For thirty years no further additions were made. Then, in 1898, came a still more radical step, the annexation of the Hawaiian Islands, more than 2,000 miles from the nearest point in the continental United States. The Spanish-American War resulted in the acquisition of Porto Rico, Guam and the Philippine Islands. In 1904 the United States acquired certain rights over a strip in Panama for the purposes of building and operating a canal between the Atlantic and



"WESTWARD THE COURSE OF EMPIRE TAKES ITS WAY"

Stars indicate the center of population by decades; triangles, the centers of improved acreage; squares, centers of farm values; circles, centers of number of farms, in the years named.

the Pacific oceans. Though under perpetual lease and practically a part of the United States, the Canal Zone is still under the sovereignty of the republic of Panama. In 1917 the Danish West Indies were acquired by purchase from Denmark, renamed the Virgin Islands of the United States. The following table contains interesting data concerning the territory added to the United States:

| TERRITORIAL DIVISION; YEAR OF ACQUISITION | ADDED AREA (SQ. MI.) | PURCHASE PRICE |
|---|---|---|
| Louisiana (1803) | 875,025 | $ 15,000,000 |
| Florida (1819) | 70,107 | 5,499,768 |
| Texas (1845) | 389,795 | ..... |
| Oregon Territory (1846) | 228,689 | ..... |
| Mexican Cession (1848) | 523,802 | 18,250,000 |
| Gadsden Purchase (1853) | 36,211 | 10,000,000 |
| Alaska (1867) | 590,884 | 7,200,000 |
| Hawaiian Islands (1898) | 6,449 | ..... |
| Guam (1898) | 210 | ..... |
| Porto Rico (1898) | 3,606 | ..... |
| Philippine Islands (1898) | 114,958 | 20,000,000 |
| Samoa (Tutuila) (1899) | 77 | ..... |
| Additional Philippines (1901) | 68 | 100,000 |
| Virgin Islands of the United States (1917). | 139 | 25,000,000 |
| Total | 2,840,020 | $101,049,768 |
| Canal Zone | 474 | 10,000,000* |
| Original Territory | 827,844 | ..... |
| Total | 3,668,338 | $111,049,768‡ |

*Besides an annual rental of $250,000.

‡Not including $16,000,000 paid to Texas in 1850 for territory then a part of the state but now included in New Mexico and other states.

**Political Divisions.** The United States is composed of forty-eight states, all of which are on the continent. The District of Columbia, in which the city of Washington is located, is a Federal district. The thirteen states which were already organized when the Constitution was adopted are known as *original states.* The first state added to the original thirteen was Vermont, in 1792; the last was Arizona, on February 14, 1912. The list is on page 5973.

Besides the states there are the territories of Alaska, Hawaii and Porto Rico, all lying outside the boundaries of the United States proper. The Philippine Islands, Guam and the Samoan Islands are dependencies whose inhabitants are not United States citizens.

**Principal Cities.** The principal cities of the United States which have been briefly referred to in the preceding topics, and hundreds of others important locally, are dealt with more fully in alphabetical order in this work. A fact which has been strongly emphasized is the growth of cities at the expense of the rural districts. This has been due in the past to two main causes—the rush of immigrants to the cities, where they colonize (referred to earlier in this article), and the movement of young people from the farms to the towns.

Agricultural conditions until within a few years tended to discourage ambitious youngsters; farm life was lonely, toil was severe, social intercourse was difficult, profits were often slight. To-day a new agricultural spirit prevails. Good roads, rapidly increasing in mileage, encourage the social spirit by increasing the ease of communication; the advent of the automobile renders a farmhouse ten miles in the country practically a suburban home, for the city can be reached in a few minutes; the telephone gives instant communication with the town and the neighbors; rural free delivery gives the farmer the advantages which city mail delivery once reserved for the towns only, and

enables the agriculturist to receive his daily newspaper and keep in as close touch with markets and world affairs as only the city man could a few years ago. Moreover, labor-saving machinery has eliminated to a remarkable degree the drudgery of farm existence. All these advantages are reducing the exodus from the country, and already in some places are turning the tide from the city back to the more independent existence in the country.

In 1910 there were in the United States 228 cities each with more than 25,000 inhabitants; there were 938 ranging from 5,000 to 25,000 people. In 1917, 235 cities had more than 25,000 each by Federal estimate which may be considered as fairly accurate, and 1,070 had populations between 5,000 and 25,000. On pages 1393-1394 is a list of the fifty most populous cities in the country, printed in order of rank, with population as estimated in 1916. (For cities described in these volumes, see lists under each state.)

| STATE | POPULAR NAME | EXTREME LENGTH | EXTREME BREADTH | TOTAL AREA SQUARE MILES | RANK | ADMITTED TO THE UNION | ESTIMATED POPULATION (1917) |
|---|---|---|---|---|---|---|---|
| Alabama | Cotton State | 330 | 200 | 51,998 | 28 | 1819 | 2,348,278 |
| Arizona | ..... | 390 | 335 | 113,956 | 5 | 1912 | 259,666 |
| Arkansas | Bear State | 240 | 275 | 53,335 | 26 | 1836 | 1,753,033 |
| California | Golden State | 770 | 375 | 158,297 | 2 | 1850 | 2,983,843 |
| Colorado | Centennial State | 270 | 390 | 103,948 | 7 | 1876 | 975,190 |
| Connecticut | Nutmeg State | 75 | 90 | 4,965 | 46 | * | 1,254,926 |
| Delaware | Blue Hen State | 110 | 35 | 2,370 | 47 | * | 214,270 |
| Florida | Peninsula State | 460 | 400 | 58,666 | 21 | 1845 | 904,839 |
| Georgia | Empire State of the South | 315 | 250 | 59,265 | 20 | * | 2,875,953 |
| Idaho | Gem of the Mountains | 490 | 305 | 83,888 | 12 | 1890 | 436,881 |
| Illinois | Prairie State | 380 | 205 | 56,665 | 23 | 1818 | 6,193,626 |
| Indiana | Hoosier State | 265 | 160 | 36,354 | 37 | 1816 | 2,826,154 |
| Iowa | Hawkeye State | 210 | 300 | 56,147 | 24 | 1846 | 2,224,771 |
| Kansas | Sunflower State | 200 | 400 | 82,158 | 13 | 1861 | 1,840,707 |
| Kentucky | Blue Grass State | 175 | 350 | 40,598 | 36 | 1792 | 2,386,866 |
| Louisiana | Creole State | 275 | 280 | 48,506 | 30 | 1812 | 1,843,042 |
| Maine | Pine Tree State | 235 | 205 | 33,040 | 38 | 1820 | 774,914 |
| Maryland | Old Line State | 120 | 200 | 12,327 | 41 | * | 1,368,240 |
| Massachusetts | Old Bay State | 110 | 190 | 8,266 | 44 | * | 3,747,564 |
| Michigan | Wolverine State | 400 | 310 | 57,980 | 22 | 1837 | 3,074,560 |
| Minnesota | Gopher State | 400 | 350 | 84,682 | 11 | 1858 | 2,296,024 |
| Mississippi | Bayou State | 340 | 180 | 46,865 | 31 | 1817 | 1,964,122 |
| Missouri | Bullion State | 280 | 300 | 69,420 | 18 | 1821 | 3,420,143 |
| Montana | Treasure State | 315 | 580 | 146,997 | 3 | 1889 | 466,214 |
| Nebraska | Tree-Planter State | 205 | 415 | 77,520 | 15 | 1867 | 1,277,750 |
| Nevada | Sagebrush State | 485 | 315 | 110,690 | 6 | 1864 | 108,736 |
| New Hampshire | Granite State | 185 | 90 | 9,341 | 43 | * | 443,467 |
| New Jersey | Garden State | 160 | 70 | 8,224 | 45 | * | 2,981,105 |
| New Mexico | ..... | 390 | 350 | 122,634 | 4 | 1912 | 416,966 |
| New York | Empire State | 310 | 320 | 49,204 | 29 | * | 10,366,778 |
| North Carolina | Old North State | 200 | 520 | 52,426 | 27 | * | 2,418,559 |
| North Dakota | Flickertail State | 210 | 360 | 70,837 | 16 | 1889 | 752,260 |
| Ohio | Buckeye State | 205 | 230 | 41,040 | 35 | 1803 | 5,181,220 |
| Oklahoma | Boomer State | 210 | 585 | 70,057 | 17 | 1908 | 2,245,968 |
| Oregon | Beaver State | 290 | 375 | 96,699 | 9 | 1859 | 848,866 |
| Pennsylvania | Keystone State | 180 | 300 | 45,126 | 32 | * | 8,591,029 |
| Rhode Island | Little Rhody | 50 | 35 | 1,248 | 48 | * | 620,090 |
| South Carolina | Palmetto State | 215 | 235 | 30,989 | 39 | * | 1,634,340 |
| South Dakota | Sunshine State | 245 | 380 | 77,615 | 14 | 1889 | 707,740 |
| Tennessee | Big Bend State | 120 | 430 | 42,022 | 34 | 1796 | 2,296,316 |
| Texas | Lone Star State | 620 | 760 | 265,896 | 1 | 1845 | 4,472,494 |
| Utah | Salt Lake State | 345 | 275 | 84,990 | 10 | 1896 | 438,974 |
| Vermont | Green Mountain State | 155 | 90 | 9,564 | 42 | 1791 | 364,322 |
| Virginia | Old Dominion | 205 | 425 | 42,627 | 33 | * | 2,202,522 |
| Washington | Chinook State | 230 | 340 | 69,127 | 19 | 1889 | 1,565,810 |
| West Virginia | Panhandle State | 225 | 200 | 24,170 | 40 | 1863 | 1,399,320 |
| Wisconsin | Badger State | 300 | 290 | 56,066 | 25 | 1848 | 2,513,758 |
| Wyoming | Equality State | 275 | 365 | 97,914 | 8 | 1890 | 182,264 |

* Original State.

## *The Federal Government*

**General Characteristics.** Originally the state was the source of all authority; the national government was created by the coöperation of the states. By the Constitution of the United States, the individual states, formerly separate colonies, granted to the national government all essential powers, and themselves agreed to refrain from using those powers. Certain powers, therefore, are reserved to the state, and it is this division of authority between the individual state and the United States that makes the latter a *Federal* government.

**The Three Branches.** The Constitution divides the powers and functions of the national government among three coördinate branches, known as the *legislative,* the *executive* and the *judicial* departments. The lawmaking body is the Congress of the United States; the executive is the President, assisted by his Cabinet; and the judicial department is the Supreme Court and the various lower Federal courts. Though these three branches are practically independent, each is restricted by certain powers of the others. Thus, the President has the power of veto over any acts of Congress, and he may also recommend new laws; Congress, in turn, may impeach and convict the President or any other officer of the United States, including judges. The Senate must confirm the President's appointments of high officers and must also approve treaties negotiated by the President or by his Secretary of State. The Supreme Court exercises a check on the powers of Congress, because it may declare laws unconstitutional. Though there are three separate branches of the Federal government, it must be remembered that these branches are not entirely free to do as they please.

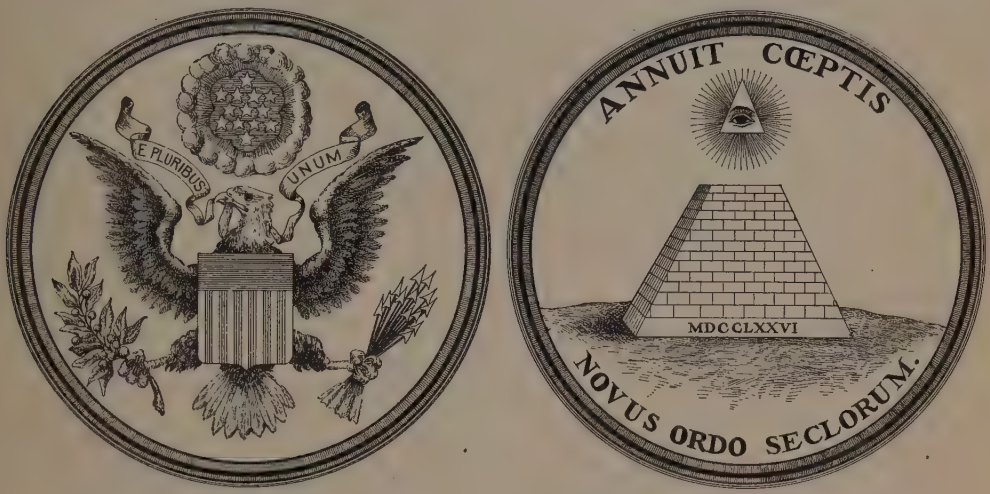
**Congress.** The legal designation of the lawmaking body is THE CONGRESS. It is composed of two chambers, the House of Representatives and the Senate. The House of Representatives is composed of members apportioned among the states according to population. Every ten years, after the decennial census, the House decides how many members it shall have during the next ten-year period. In 1911 the number was fixed at 433, which gives one Representative for 211,430 inhabitants; the addition of members from the new states of Arizona and New Mexico gave it 435 members. New York has the largest number of Representatives, forty-three, while Arizona, Delaware, Nevada, New Mexico and Wyoming each have only one. Each state, no matter how small, has at least one member in the lower House. (See chart, page 4973.)

The Senate is composed of two members from each state, formerly chosen by the state legislatures, but since the adoption of the Seventeenth Amendment in 1913, elected by popular vote. The framers of the Constitution were divided into two groups—the small-state and the large-state elements. The delegates from the small states feared that the large states, with their greater populations, would always outvote the small states, if all representatives in Congress were elected in proportion to population; the delegates from the large states, on the other hand, were unwilling to give the small states, with less population, an equal voice with the large states. A compromise was finally effected, each state being represented by two Senators and by Representatives whose number should be determined according to population. The Senators, chosen from the state at large, were supposed to represent their states directly, while the Representatives, chosen from Congressional *districts,* were to represent more directly their particular localities. The powers of these two houses are fully described in the articles CONGRESS OF THE UNITED STATES; SENATE; REPRESENTATIVES, HOUSE OF.

**The President.** The executive head of the United States is the President, whose term of office is four years. He is the commander-in-chief of the army and the navy, he approves or vetoes acts passed by Congress, and it is his duty to see that the laws are properly obeyed throughout the country. The Vice-President is the presiding officer of the Senate; he possesses no executive powers unless the President is prevented permanently from fulfilling his duties. Assisting the President is the Cabinet, composed of the heads of departments, all appointed by the President, with the approval of the Senate. In Washington's Cabinet there were only three members—the Secretary of State, the Secretary of the Treasury and the Secretary of War. Washington also appointed an Attorney-General and a Postmaster-General, but these officers were not legally members of his Cabinet. To these three original departments the following have been added: Navy, in 1798; Postoffice, in 1829; Interior, in 1849; Justice, in 1870; Agriculture, in 1889; Commerce and Labor, in 1903. In 1913 this last department was divided into the Department

of Commerce and the Department of Labor. The work of each department is explained in a special article.

**Judicial Department.** The only court required by the Constitution is the Supreme Court of the United States, but "Congress may, from time to time, ordain and establish" inferior courts. Besides the Supreme Court there are nine circuit courts of appeal, ninety-nine district courts, a court of claims, a court of private land claims, a supreme court and a court of appeals for the District of Columbia, an admiralty court and territorial courts. In addition to these Federal courts, the states maintain systems of courts, described in the articles on each state.




OBVERSE AND REVERSE SIDES OF THE GREAT SEAL OF THE UNITED STATES

**Territories and Dependencies.** Most of the states admitted to the Union since 1789 were first organized as territories, which are in most respects similar to states, but have no independent action. The governor and other chief officials are appointed by the President, and the acts of the territorial legislature are subject to the approval of Congress. The acquisition of the Philippine Islands and Porto Rico after the Spanish-American War presented a new problem in government, which was met by forming territorial organizations. The only territories now remaining are Alaska, Hawaii and Porto Rico. The Philippine Islands are not, strictly speaking, a territory.

**State and Local Government.** As explained above, all powers not especially granted to the national government are reserved to the states. In general, it is true that the state stands much closer to its citizens than does the national government. The state controls such intimate matters as education, marriage and divorce, suffrage, criminal law, property, professions, trades and taxation. Except for the income tax the Federal government levies no direct taxes.

Each state has a constitution, usually drawn up by a special convention and subsequently approved by the voters. The state governments, in their fundamental features, all resemble the Federal government. Each state has a legislature of two houses, usually called the senate and the house of representatives. In six states the lower house is the *assembly,* and in three the *house of delegates.* Usually the term of senators is four years; of representatives, two years. The voters elect the executive officers, who are usually a governor, lieutenant-governor, secretary of state, treasurer, attorney-general and superintendent of public instruction, although in a number of states the last officer is appointed by the governor. The state courts are of such variety that it is impossible to summarize them here, except to say that all states have a supreme court, or court of appeals, with a number of lower courts. The judicial systems of the states are described in the articles on each state.

**Types of Local Government.** As the state is the source of all home government, it provides for local administration. There are three general types of local government, based on early colonial forms:

(1) In the *township* or New England type, the town or township is the unit of government. The town officers are chosen at an annual meeting of the voters, and they transact all the public business.

(2) In the *county* or Virginia type, the local unit is the county. Public business is transacted by elected officers, usually called county commissioners or supervisors. This type still predominates in the Southern states, where large estates and relatively low density of population formerly prevailed.

(3) In the *mixed* type the best elements of the other types are found, both the county and township existing, one within the other. The township officers have certain local functions, but the more important duties fall on county officers. This compromise system, which originated in New York and Pennsylvania, has proved more satisfactory than either of the others, and has been generally used as a model in the newer Western states. It is economical, and stimulates local interest in government.

## *Summary of United States History*

**Discovery and Exploration.** When Columbus in 1492 first landed in the New World, he found a native race of red men, whom he called *Indians,* because he thought that this land was India. Who these Indians were, whether they were of mixed European and Asiatic origin, whether they were descendants of the Mound Builders or of some other race, is not certain. It is also uncertain who among modern Europeans was the first to reach America. Norse tradition says that in the year 1000 Leif, the son of Eric the Red, found a land in the west which he called Vinland, and it is not unlikely that the hardy fisherman of Northern Europe crossed the Atlantic both before and after Leif's supposed voyage.

The real discoverers of the New World were the men who reached it, explored it, and returned home to tell the tale. First of these was Christopher Columbus, who discovered the Bahamas and Cuba in 1492. The discovery of the mainland of North America is credited to John Cabot, who explored the Labrador coast in 1497; his son Sebastian Cabot also made several voyages to the same region. About the same time Americus Vespucius was exploring the coast of Brazil. Balboa discovered the Pacific Ocean in 1513, and Ponce De Leon searched for the fountain of youth in Florida in the same year. In 1521 Cortez conquered Mexico, Fernando De Soto discovered the Mississippi River in 1541, while Coronado explored what is now the southern part of the United States. Other early explorers were Narvaez, Verrazano and Magellan.

**First Settlements.** The earliest attempts at permanent settlement were made by the French. Jacques Cartier, who in 1534 sailed up the Saint Lawrence as far as Montreal, established a settlement there in 1540, but abandoned it three years later. In Florida the French Huguenots, under the leadership of Jean Ribault, established a colony, but they were wiped out in 1565 by a Spanish force. On the site of the French settlement the Spanish built a fort, around which grew the town of Saint Augustine, the first permanent settlement in the United States.

While the Spaniards gradually established their power in the southern part of North America and in all of South America except Brazil, the French were occupying the Saint Lawrence Valley, whence trappers, traders and priests penetrated the great interior valley of the United States. In the work of seizing and holding this great area for France were many great leaders—Champlain, Marquette, Joliet, La Salle, Frontenac, Iberville. From Quebec to Mobile their missions and trading posts dotted the country. But the French, like the Spaniards, were not great colonizers; they came as conquerors, to acquire a new dominion for the king and the Church. The English colonists, on the other hand, came to establish new homes for themselves. They brought their social institutions, their schools and churches and their political beliefs. Many of them, too, came not from love of adventure or in the search for wealth, but because of political or religious persecution. These differences in character and purposes of the people were largely responsible for the fact that English influence prevailed in the United States.

**The Thirteen Original Colonies.** In the early explorations the English had taken little part. Not until Queen Elizabeth's reign, which began in 1558, did England attempt to strengthen the claims which the voyages of the two Cabots had given her. Sir Walter Raleigh, Sir Francis Drake, Sir Humphrey Gilbert and Sir John Hawkins were leaders in exploration, but Raleigh's attempts to found a colony in Virginia were failures. In 1606 King James I granted to the London Company and the Plymouth Company charters by which they had the right to colonize and trade in "Virginia." As defined by these charters Virginia extended from 34′ to 45′ N., or from Cape Fear to the Bay of Fundy. In 1607 the London Company, which had been granted "Southern Virginia," founded Jamestown, the first English settlement within the limits of the United States, and in

# FLAGS OF THE STATES

# FLAGS OF THE STATES

1620 the Pilgrims, who had received a grant from the London Company, landed by mistake at Plymouth, which was in the Plymouth Company's grant. Two noteworthy events occurred at Jamestown in 1619; these were the meeting of the first legislative assembly in America, and the first importation of negro slaves.

Other English settlements began to dot the coast. In 1628 Salem was founded as the Massachusetts Bay Colony. By 1650 there were five separate colonies in New England, each composed of several towns and smaller settlements. The largest was Massachusetts Bay, with its center at Boston. North of this colony were a few small settlements in New Hampshire and Maine, but these were not united or large enough to be considered a separate colony. The second colony was Plymouth, founded by the Puritans. The third was Rhode Island, founded by Roger Williams and Anne Hutchinson, two religious exiles from Massachusetts.

Other troubles in Massachusetts had led several congregations to move in a body to the Connecticut River valley, where they founded Windsor, Hartford and other towns. These settlements in 1639 drew up a written constitution, called the "Fundamental Orders of Connecticut," which united them in a sort of republic, the fourth of the colonies. This was not only the first written constitution in America, but it was the first time in the history of the world that a new state had been created by a constitution. The colony of New Haven was established in 1639, but was united to Connecticut in 1682. An event of much importance was the formation of the New England Confederation in 1643.

While New England was thus growing, colonies were being established at other places. Maryland was founded in 1634 by settlers sent out by Lord Baltimore, the lord proprietor. Meanwhile, five years after Henry Hudson ex-

COMPARATIVE LATITUDES, NORTH AND SOUTH OF THE EQUATOR

In the above map of the two Americas South America has been folded upon the northern hemisphere, at the equator. Rio de Janeiro's latitude south compares with that of Havana, north; Valparaiso's, with Savannah's. Those latitudes in the United States and Canada where population is densest are between 35° and 50° north; there are no cities of importance in the corresponding southern latitudes. As a further comparison of world latitudes, it may be noted that London and Winnipeg are at about equal distances north of the equator.

plored the river now named for him, the Dutch founded the colony of New Netherlands (1614), and established a flourishing trade with the Indians. In 1638 a small party of Swedes settled at the mouth of the Delaware River and called their settlement New Sweden. The Dutch, under the leadership of the famous Peter Stuyvesant, seized New Sweden and annexed it to their territory in 1655. Only nine years later, in 1664, an English fleet arrived before New Amsterdam, the settlement surrendered without resistance, and New Netherlands became an English possession. King Charles II gave the colony to his brother James, duke of York (later James II), who renamed it New York. Then James sold the southern part of the colony to Sir George Carteret and Lord Berkeley, who there founded New Jersey. Pennsylvania was founded by William Penn as a refuge for Quakers, in 1682-1683. Religious and political freedom in Pennsylvania led many people to settle there, and in a few years it was larger than any other of the colonies except Virginia and Massachusetts.

In the South the Carolinas were first settled by Virginians, but in 1663 these were granted to a company of eight nobles, all intimate friends of Charles II. An elaborate constitution for the new colony was written by the philosopher, John Locke, but it was never put into practice. The Lords proprietary cared little about the colony, and in 1729 they surrendered their rights to the king. The last English colony was Georgia, founded in 1732 by James Oglethorpe, who planned to transport debtors to Georgia instead of locking them in prisons in England (see DEBT).

The growth and development of these original colonies is described in the articles on each of the thirteen original states. Settlers were gradually coming in larger numbers, and the colonies were generally prosperous. Towards the end of the seventeenth century, however, France and England became engaged in a series of wars, in which the colonies of both nations were the prizes. The struggle lasted from 1689 to 1763, when France surrendered to England the whole of her possessions in North America, except a few small islands (see FRENCH AND INDIAN WARS).

From the very beginning of the settlements, each colony had maintained its own system of defense against the Indians. The French and Indian Wars, with their long campaigns against hardy Indians and regular soldiers, proved the need of some union among the colonies. The separate colonies were no match for their enemies on the west. The pressure thus exerted from the outside, combined with a consciousness that the colonies had other interests in common, led to the Albany Congress of 1754, which adopted Benjamin Franklin's plan for a union of all the colonies. Unfortunately this plan was rejected by all the colonies and also by England. The cause of the rejection, as stated by Franklin, deserves notice: "The Assembly did not adopt it, as they all thought there was too much *prerogative* in it, and in England it was judged to have too much of the *democratic*."

**Causes of the Revolution.** The close of the French and Indian War affected the colonies in two important ways. First, it removed the pressure of the French on their frontiers and lessened their dependence on Great Britain for military support. The new feeling of military independence was increased by their own experience; the colonial militia had fought side by side with regular soldiers and had proved its worth. The second result was equally important—the home government introduced new taxes to help pay the expenses of the war. There was a growing sentiment in England that the colonies should be willing to make some sacrifices for the mother country and for the great British Empire which was being built.

During the wars the colonies had carried on considerable smuggling, and in the general reorganization of trade which followed, the British officials attempted to enforce the Navigation Acts. In 1764 Parliament passed the Sugar Act, placing an import duty on sugar and molasses. An act of 1733, which had never been enforced, was a precedent for this duty, but in New England the cry was at once raised that the manufacture of rum would be prevented and a great industry ruined if the duty was collected. Popular indignation, aroused by the enforcement of the act by writs of assistance, a year later was intensified by the Stamp Act.

The stamp tax itself was not a novel idea, but it represented a new policy of direct taxation by Parliament instead of the former policy of requisitions on the colonial assemblies. The protests against the Stamp Act took many forms; resolutions were passed by the assemblies; the Stamp Act Congress, with delegates from nine colonies, was held in New York; a movement against importation and for the encouragement of home industries quickly arose; mobs everywhere destroyed the supply of stamped papers. The Stamp Act was repealed

within a year, but Parliament also passed the Declaratory Act, restating the principle of colonial taxation. Though the Stamp Act was repealed largely because of a ministerial change at home—Pitt became Prime Minister—the colonists properly interpreted the repeal as a victory for them, and were quick to appreciate their growing power.

The repeal of the Stamp Act, however, was followed by the Townshend Acts, one of which provided duties on glass, lead, tea and other commodities. It must be remembered that one of the chief reasons for these numerous taxes was the British government's intention to maintain a standing army in the colonies, ostensibly to furnish protection, but also, as a matter of fact, to enforce the acts of Parliament. The bitter opposition of the colonists to this policy had its climax in the Boston Massacre in 1770. Actual bloodshed seemed to have had a sobering effect on both sides for over a year, but in June, 1772, the British schooner *Gaspee,* which had been trying to suppress smuggling in Narragansett Bay, was destroyed by a band of colonists, and in December, 1773, a crowd of Bostonians, disguised as Indians, threw some 340 chests of tea into Boston harbor. As a punishment for such acts, Parliament in 1774 passed the Quebec Act and a number of coercive measures (see INTOLERABLE ACTS), including the Charter Act, which greatly lessened the degree of popular control of the Massachusetts government, and the Boston Port Bill, which closed the port of Boston to commerce. At the same time General Thomas Gage was appointed governor of Massachusetts, with orders to carry out the terms of these acts, by force if necessary.

Massachusetts, now sorely beset, asked the views of the other colonies, and issued a call for a congress, to meet at Philadelphia, to discuss measures for maintaining the rights of the colonists. This body, the first Continental Congress, met on September 1, 1774, and after passing resolutions supporting Massachusetts and agreeing not to import goods from Great Britain, adjourned until May 1, 1775. In the meantime the British government had resolved to enforce the laws, and had sent 10,000 additional troops to America. Especially in Massachusetts the feeling that war was inevitable was growing stronger, and General Gage sent several expeditions to seize the stores of military supplies which the colonists were collecting. On April 19, 1775, one of these expeditions, on its way to Concord, met opposition at the village of Lexington, where the first blood in the Revolution was shed (see LEXINGTON, BATTLE OF).

There was no longer thought of compromise. The news of the encounters at Lexington and Concord brought nearly fifteen thousand "minutemen" to the vicinity of Boston. So strong was the feeling of resistance that during 1774 and 1775 the governors of nearly all the colonies resigned or fled to England, and the general government was now assumed by the second Continental Congress, which resolved to raise an army of 2,000 men. The first important battle between the British forces and the Americans was at Bunker Hill, where the British won a victory, but at such cost that its moral effect on the Americans was good. The history of the war is given in a special article on the REVOLUTIONARY WAR IN AMERICA. (See, also, articles on the leading soldiers and statesmen of the period.)

**The Articles of Confederation.** At the beginning of the war the colonists insisted that they were fighting merely for their rights, and declared themselves loyal subjects of the king. But the course of events led in another direction, and on July 4, 1776, the Declaration of Independence was proclaimed. Even earlier, however, the individual colonies had begun to organize state governments and had adopted constitutions. The great problem now before the Congress was how to form a permanent government which should unite these new states. The first draft of the Articles of Confederation, which sought to accomplish this purpose, was prepared by John Dickinson and submitted to Congress soon after the signing of the Declaration of Independence, but the rush of war matters caused it to be laid aside until the autumn of 1777.

The Articles were a vast improvement over the method of government then in vogue, but they had many weaknesses. So strong was the sentiment for state's rights that even this weak national organization was not completed without difficulty. All of the large states except Pennsylvania had claims to areas west of the Appalachians. The small states—New Hampshire, Rhode Island, New Jersey, Delaware and Maryland—hesitated to enter the Confederation if the large states were to be still further enlarged by the addition of this western territory; they insisted that all these claims should be yielded to the United States. Jealousy, and perhaps a fear that they would be absorbed by the large states, led the small states to take

this stand. Maryland held out until 1781, when Congress declared that the ceded land should be divided into states which should have all the rights of the original states. All the other states having already ratified the Articles, Maryland's ratification finally put them into effect.

Soon after the Articles of Confederation were first submitted to the states there was a belief in many quarters that a stronger central government was necessary, but it took years of bitter experience to make this need clear to everybody. The worst flaw in the government before the adoption of the Constitution was that the central government was powerless to raise money by taxation. In the years 1783-1786 Congress made requisitions on the states for about $10,000,000, but less than one-fourth of this amount was received. Important legislation in Congress was almost impossible under the Confederation, because the votes of nine states were needed to pass a law. There was no executive head of the government, Congress was rapidly becoming a mere name, and the separate states were losing all sense of responsibility toward each other.

Independence had been won by arms, but it now seemed that unity could not be won by any means. Congress asked for power to control commerce, but the states refused to give it. The decisions of various state courts differed on similar issues, and Congress had no way of reconciling them. One power Congress had, and which it exercised, was control of the territory ceded by the various states to the central government. The famous Ordinance of 1787 is undoubtedly the most creditable monument of what John Fiske has called the "critical period of American history."

The machinery of Federal government had practically broken down several years before the Constitution was adopted. The national government, as Washington said, was but "the shadow without the substance." The ablest men, who might have built up a strong government if there had been any foundation, preferred to give their time to state and local affairs. To amend the Articles was practically impossible, as the unanimous consent of the states was needed. But underneath this shadowy structure of Confederation was the fact that union and independence were complementary, and that the thirteen colonies, in some senses at least, had become a nation. When this fact was reflected in the general sentiment a change was inevitable.

**Adoption of the Constitution.** The change came in a roundabout way. In 1785 Maryland and Virginia appointed delegates to arrange for the regulation of navigation on the Potomac River and in Chesapeake Bay. At the suggestion of the delegates, the Virginia assembly proposed a convention, in which all the states should be represented, to draw up commercial regulations for the United States. The convention met at Annapolis, Maryland, in 1786, but only five states were represented. At Alexander Hamilton's suggestion this Annapolis Convention adjourned after issuing an appeal to all the states to send delegates to a constitutional convention to be held in Philadelphia in the following year. Congress seconded the call for the convention, and on May 25, 1787, delegates from all the states except Rhode Island met in Philadelphia.

An abler body of men has probably never met in the United States. George Washington was elected president of the convention. Among the delegates were James Madison, Edmund Randolph, Benjamin Franklin, Gouverneur Morris, Robert Morris, James Wilson, Rufus King, Elbridge Gerry, Roger Sherman, Oliver Ellsworth, Alexander Hamilton and Charles Cotesworth Pinckney.

The sessions of the Convention soon showed that there was a sharp decision among the delegates on two fundamental questions—the basis of representation in Congress and the extent to which the states should surrender their sovereign rights to the national government. As to representation, two plans were first proposed: the "Virginia plan," advocated by the large states, provided that in both houses representation should be by population; the "New Jersey Plan," advocated by the small states, provided for equal representation in both branches. The plan finally adopted was a compromise, equal representation in the Senate, and representation by population in the House of Representatives. As to the powers of the national government, one party wished a strong, centralized system; the other, a decentralized system, in which the states should remain supreme. Here again compromise was necessary, all powers not granted to the new government being reserved to the states.

Thus, in all essentials a compromise, the Constitution of the United States completely satisfied but few people. The differences which had existed among the delegates now appeared among the states, when the Constitution was submitted for their approval. Especially in

THE UNITED STATES IN 1789

The Mississippi River formed the western boundary; beyond was the dominion of Spanish America, and at the south Spain owned the Florida peninsula.

Massachusetts, New York and Virginia there was great opposition. The leaders in the fight for adoption were Alexander Hamilton, who wrote nearly all of the papers in the *Federalist,* and James Madison, John Jay and Henry Lee. Washington also favored its adoption. The Convention adjourned on September 17, 1788, and on June 25 and July 26, respectively, Virginia and New York voted for it. North Carolina did not ratify the Constitution until November, 1789, and Rhode Island not until May, 1790.

After the ratification by all the states, the old Congress of the Confederation planned the details of the election for national officers. In February, 1789, George Washington was elected President, and John Adams Vice-President. The inauguration took place on April 30, 1789, at New York.

**National Government.** *Federal Supremacy.* Thus ended the Confederation, which had never been more than the "league of friendship" it claimed to be, and had occasionally threatened to be less. In its place was a new national government, based on a Constitution which was generally regarded as the best that could be made at that time. At the head of the government was a man of tried ability, who had kept out of factional quarrels and had earned universal respect. The administration needed all the encouragement it could gather from these facts; many important questions demanded prompt settlement, and there were already two political factions which differed on the interpretation of the powers granted to the national government (see ANTI-FEDERALISTS; FEDERALIST PARTY).

Washington appointed Hamilton, the leader of the Federalists, or loose constructionists, as Secretary of the Treasury, and Jefferson, the leading strict constructionist, as Secretary of State. On Hamilton particularly fell the burden of organizing the new government. The first tariff act, the act creating a Bank of the United States, the assumption of the state debts and the funding of the national debt were adopted substantially as he had planned. The national mint and system of coinage were also

established by him. The adoption by the First Congress (1791) of the first ten amendments to the Constitution, which may be said to constitute a bill of rights, was important in that it helped to quench some lingering opposition to the new government. On the whole the first administration of Washington proved the success of the new government; the states found that they had now to deal with a government possessing powers which it was not unwilling to use. During this administration Congress chose the banks of the Potomac as the site of a permanent capital of the United States.

In 1793 Washington was reëlected President, though somewhat against his own wishes. His first administration was concerned almost exclusively with domestic affairs—with the organization of the governmental machinery. During his second administration interest was centered almost as exclusively on foreign relations, particularly with France and Great Britain, who were then at war. The first important incident was the arrival of Edmond Genet, who sought aid for the new French republic. He commissioned privateers, and even tried to raise recruits for an expedition to seize Louisiana from Spain, but Washington issued a proclamation of neutrality and warned Genet to cease his activities. The proclamation of neutrality, the first act of its kind in United States history, caused a distinctly partisan division in politics.

The followers of Jefferson, imbued with the spirit of Thomas Paine and the French Revolution, reproached the administration for its ingratitude to France, accused it of monarchical tendencies, and began to call themselves Republicans, or Democratic-Republicans. The Federalists, on the other hand, believed that the British form of government, if the king were removed, was best, and their sympathies lay with England in the war. The unsatisfactory Jay Treaty, together with England's refusal to surrender her forts in the Northwest and to grant any rights to American shipping, also strengthened the Republican opposition. The first rebellion against the United States, the Whisky Insurrection, it was even charged, was stirred up by the French party. By treaty with Spain in 1795, the United States secured the free navigation of the Mississippi, and as the result of Anthony Wayne's victory over the Indians at the Battle of Fallen Timbers (1794), most of the present state of Ohio was opened to peaceful settlement.

The troubles with France came to a head in 1797, when France demanded that the Jay Treaty be annulled and broke off diplomatic relations with the United States. John Adams, who had succeeded Washington as President, sent three commissioners, Charles C. Pinckney, John Marshall and Elbridge Gerry, to Paris, to negotiate for a renewal of relations, but the mission failed (see X Y Z Correspondence). For a short time it appeared that war would result. Washington was appointed commander-in-chief of the army, and the President was authorized to issue letters of marque and reprisal, but except for a few small naval encounters, open warfare was prevented because Napoleon in 1799 overthrew the Directory and renewed friendly relations.

The excitement over the threatened war had important political results. It led to the passage of the Alien and Sedition laws of 1798, which roused great opposition among the Republicans and induced Jefferson and Madison to frame the Kentucky and Virginia Resolutions. It also led to a split in the Federalist party, Hamilton being in favor of keeping up the war spirit, while Adams inclined to peace. The Hamilton faction voted for Charles C. Pinckney in the election of 1800, cutting Adams' electoral vote in half. Burr and Jefferson, the Republican candidates, each received seventy-three votes, Adams sixty-five votes, and Pinckney sixty-four votes. The election was thus thrown into the House of Representatives, which finally elected Jefferson President and Burr Vice-President.

**Jefferson and Madison.** This election of 1800 ended Federalist supremacy. It marked the reaction away from centralization of authority, from an aristocratic government, some historians have said, to democracy and equal rights for every individual. Some writers have even spoken of the "revolution of 1800," so great was the change in the government's attitude. Jefferson took office with the belief that the Constitution stated all the powers of the national government and that it was proper to reduce these admitted powers to a minimum. His policy of strict construction was pushed aside by circumstances. The war with Tripoli (see Barbary) compelled the government to increase the efficiency of the navy. Again, in 1803 Jefferson took a step necessitating a broader interpretation of the Constitution than any act of either of his predecessors, both loose constructionists; this was the purchase of Louisiana. To explore this great addition to United States territory he sent out the Lewis and

Clarke Expedition, which also established a claim to the Oregon country. A repetition of the troubles attending Jefferson's election to the Presidency was made impossible in 1804 by the adoption of the Twelfth Amendment to the Constitution, the electors being thereafter required to vote separately for President and Vice-President.

Jefferson was reëlected President in 1804, Charles C. Pinckney, his opponent, receiving only fourteen electoral votes to Jefferson's 162. George Clinton was elected Vice-President. Though all his important achievements were contrary to his own theory of government, Jefferson's first administration was a pronounced success, and his party was in an overwhelming majority at the beginning of his second term. After the expiration of the Jay Treaty in 1806, Jefferson's troubles began. He refused the only treaty which Great Britain was willing to offer as a substitute. As Great Britain was at war with some country nearly all the time, what was to become of American commerce? Great Britain said that any shipment from colonies to a mother country at war with Great Britain was contraband, and that the United States as the carrier would be an ally of the other country. This was a new policy, for Great Britain had previously admitted that transshipment or "breaking bulk" in a United States port would be sufficient to constitute a neutral trade. Now the United States sought to enforce this old doctrine by moral force alone. Great Britain, by orders in council, declared Europe in a state of blockade; Napoleon replied by the Berlin Decree, blockading the British Isles; to this Great Britain retorted by forbidding American commerce with any nation where British trade was excluded. Napoleon issued a last decree at Milan, declaring that any vessel which submitted to search by a British vessel was a lawful prize.

The only effective method of replying to these various documents was a naval war; instead, Congress passed the Embargo Act of 1807 and the Non-Intercourse Act of 1809, which literally destroyed American commerce and caused great hardships among many classes, particularly in mercantile New England. Relations with Great Britain were further embarrassed by the impressment of American seamen. Jefferson's second administration was also noteworthy for the prompt suppression of Burr's conspiracy, for the abolition of the slave trade in 1808 and for Fulton's success in building the first steamboat.

*The War of 1812.* All these events, however, were overshadowed by the troubles with Great Britain, as James Madison, Jefferson's Secretary of State and his successor as President, soon found. Madison attempted to carry on Jefferson's policy, but without success. The war party was constantly growing in strength, particularly after the battle of Tippecanoe, in which General William Henry Harrison defeated the Indians, most of whom fled to Canada. The political campaigns of 1811-1812 resulted in the defeat of many of the "submission men," and the election of young men from the South and West, like Henry Clay, John C. Calhoun and William H. Crawford, who were determined to fight. Madison still counselled peace, but the war party was too strong for him, and on June 18, 1812, three months after the beginning of his second term as President, war was declared against Great Britain. (For the story of the military and naval operations, see War of 1812.)

*A New Era.* The end of the war marked the end of an era in United States history. During the war or immediately after its close Congress had passed numerous laws to which the Democratic-Republicans had formerly been bitterly opposed. The Bank of the United States had been rechartered, a protective tariff had been passed (1816), and large amounts were appropriated for internal improvements. The Federalists' thunder had been stolen. Furthermore, the unpatriotic though not wholly unjustified criticisms which the Federalists had heaped on the administration for its conduct of the war made the Federalist party very unpopular. Lastly, the entrance of the West as a political factor meant a new impulse toward nationalism, and it introduced new issues.

**New Issues and New Parties.** These new issues were the tariff and slavery, but during the whole of Monroe's administration the discussion of these topics, though earnest, was so lacking in bitterness that these eight years (1817-1825) are generally known as the "Era of Good Feeling." It was essentially a period of transition and development. Six new states were admitted—Indiana, Mississippi, Illinois, Alabama, Maine and Missouri. The Erie Canal and other improvements were completed. Two events of far-reaching importance—one in domestic politics, one foreign—stand out in Monroe's administration. These, the Missouri Compromise of 1820 and the promulgation of the Monroe Doctrine, are discussed in special articles.

During most of Monroe's administrations there had been only one organized political party, the Republican; the Presidential campaign of 1824 was waged largely on the personalities of the candidates, Andrew Jackson, John Quincy Adams, Henry Clay and William H. Crawford, all of whom claimed to be Republicans. As no candidate received a majority of the electoral vote, the election was thrown into the House of Representatives, in which the adherents of Clay cast their votes for Adams, thus securing the latter's election over Jackson, who had received the largest number of electoral votes. Calhoun was chosen Vice-President. The election of Adams was followed by a howl from the Jacksonians, who insisted that there had been a "corrupt bargain" between Adams and Clay. All the bitterness which had been held in check for several years now burst forth. So violent did the opposition become that the administration was able to carry out few of its policies. It did, however, spend large sums of money on various internal improvements, and it secured the passage of the protective tariff act of 1828, often called the "Tariff of Abominations." This act led to the nullification controversy a few years later.

Adams' administration was further noteworthy for rapid immigration to the West, and for the formation of new political parties. The basis of the new parties was largely antagonism between Adams and Jackson; the Adams and Clay faction took the name of National Republican party, later changed to Whig, while the Jackson men called themselves Democrats, instead of Democratic-Republicans, as formerly. There was a growing discontent with the Adams administration, with existing political conditions and other standards in life. This feeling showed itself in such changes as the substitution of national conventions for the Congressional caucus (see page 1239), and particularly in the election of Andrew Jackson as President.

**Jackson and Van Buren.** Jackson's Presidency, from 1829 to 1837, has often been called his "reign." Certainly his decisive, abrupt character dominated the government, although he was continually fighting to have his way. Two great issues were the rechartering of the Bank of the United States and the enforcement of the high tariff laws of 1828 and 1832. South Carolina's threat to secede if these laws were enforced led to the famous nullification controversy, a feature of which was the great debate between Daniel Webster and Robert Y. Hayne (see NULLIFICATION). Jackson was opposed to the Bank of the United States; he vetoed a bill renewing its charter, made the Bank the chief issue of his campaign in 1832, and was triumphantly reëlected President. Martin Van Buren was chosen Vice-President. Indian wars in Georgia and Florida gave much trouble during the second administration (see SEMINOLE; OSCEOLA; CHEROKEE), and the Black Hawk War had to be checked in the West. Jackson also introduced the "spoils system" into national politics (see CIVIL SERVICE).

Jackson's successor was Van Buren, his friend and supporter, who continued his opposition to the Bank of the United States and finally replaced that institution with the independent treasury system of to-day (see TREASURY DEPARTMENT). Van Buren was unfortunate in beginning his administration under the shadow of the great panic of 1837, precipitated by President Jackson's specie circular of 1836, which ordered land agents to accept only gold and silver in payment of public lands. This order, following an era of over-expansion, of "wildcat" banks and still wilder internal improvements, brought large sums of paper money to the East, where many banks simply closed their doors without a struggle to redeem the depreciated paper. See WILDCAT BANKS.

*Rise and Decline of the Whigs.* Chiefly as the result of the financial and industrial depression which followed, Van Buren became increasingly unpopular, and in the election of 1840, known as the "log-cabin and hard-cider campaign," was defeated for reëlection by William Henry Harrison, the Whig candidate. In this election the Liberty party presented the first candidate for President on an antislavery platform. Harrison died a month after his inauguration, and was succeeded by John Tyler, who had been formerly a Democrat. He quickly came into conflict with the Whigs when Congress passed a law establishing a fiscal bank of the United States, modeled on the old bank which Jackson and Van Buren had overthrown. To the surprise of everybody, Tyler vetoed this bill, as he did a second bill which was drawn up in accordance with his own suggestions. It was clear that Tyler at heart was still a Democrat. The Whigs were furious, Tyler was read out of the party, and the entire Cabinet except Webster resigned. Webster remained only to complete the Webster-Ashburton Treaty; then he, too, refused to serve longer.

Thus deserted by the Whigs, Tyler turned for support to the Democrats, but the Whigs were

THE UNITED STATES IN 1804

The Louisiana Purchase pushed the American boundary westward half way to the Pacific Ocean. Spain still retained Florida and the mountain section.

in the majority in Congress, and they kept Tyler practically helpless. The Senate vetoed a treaty, negotiated by the administration, for the future annexation of Texas. The Texas question now became of paramount importance; if Texas were not annexed, the time might come when the free states could control the Senate as they now controlled the House of Representatives. This possibility was far from remote, as the growth of the Liberty party showed; in 1840 James G. Birney, its candidate, polled only 7,000 votes, whereas, in the election which now ensued, he polled nearly 70,000, a sufficient number drawn from the Whigs to cause the election of James K. Polk over Henry Clay.

Polk was elected on a platform which demanded the "reannexation of Texas" and the "reoccupation of Oregon" to the line of 54° 40′ N. The campaign cry was "fifty-four forty or fight," but a treaty was signed on June 15, 1846, which made both these conditions impossible (see OREGON, subtitle *Government and History*). Meanwhile, the Texas question was settled by annexation and the admission of Texas as a state.

The Mexican War, which followed, was caused by Polk's order to General Zachary Taylor to take possession of territory claimed by both the United States and Mexico. The war resulted in the addition of considerable territory to the United States (see page 3764) and in the increased importance of the slavery question (see WILMOT PROVISO). The Democratic party split into two groups, the Southern element favoring squatter sovereignty, and the Northern element joining with the Liberty and the antislavery Whigs to form the Free-Soil party. The disorders in California, which followed the discovery of the gold in 1848, and the great rush of the "Forty-niners" was another complication in the situation which confronted the administration. Congress was so hopelessly divided into factions that Polk took it upon himself to authorize the Californians to organize a state government. Polk, however, was

succeeded by Zachary Taylor before California was admitted.

Taylor's election was regarded as a great Whig triumph; in reality it marked the downfall of the Whigs. Lewis Cass, the Democratic candidate, and Van Buren, the Free-Soil candidate, represented parties with definite policies. The Whig party had steadily refused to commit itself on the slavery question; its policy was to evade the issue. In this dilemma its only salvation lay in Taylor, the "hero of Buena Vista," who was nominated and elected. The Whigs, however, labored for conciliation, and chiefly through the efforts of Webster and Clay, achieved the Compromise of 1850. For a short time these compromise measures seemed to be a real solution of the controversy, and the administration of Fillmore, who became President after the untimely death of Taylor, was comparatively free from violence of speech or action.

But this peacefulness was only on the surface. The Compromise of 1850 was followed by a period like that preceding the War of 1812. The older statesmen, Clay, Webster, Calhoun, Polk and Taylor, the leaders of a generation, had died. The new men who gradually succeeded to their leadership were radicals. Charles Sumner, William H. Seward and Salmon P. Chase, who entered the Senate, were antislavery men of ability; men like Jefferson Davis and Alexander H. Stephens, on the other hand, insisted that Congress was bound to defend the institution of slavery in the territories from attack.

**Slavery the Issue.** In this period of transition the Democratic candidate, Franklin Pierce, was chosen President in 1852 by an overwhelming electoral vote. Practically the whole of Pierce's administration is covered by the fights in Congress over the admission of Kansas and Nebraska. The enforcement of the Fugitive Slave Law had already caused considerable friction between the North and South, and the Kansas-Nebraska Act of 1854 reopened all the old controversies. Under the Missouri Compromise, slavery was prohibited in these territories, but by this new act, which embodied the theory of squatter sovereignty, championed by Stephen A. Douglas, the prohibition of slavery was left to the choice of the inhabitants. The act was not passed without a bitter struggle in Congress, while in the territories there was lawlessness and bloodshed in the attempt to control the local governments (see KANSAS, subhead *History*).

Foreign relations, including Commodore Perry's visit to Japan and the Ostend Manifesto, were overshadowed by political events at home. Between 1854 and 1856 there arose a great political party, whose announced purpose was to prevent the extension of slavery in the territories. Made up chiefly of Whigs and Know-Nothings, this opposition, though still unorganized, elected many of its candidates to Congress, and in 1855 controlled the House of Representatives; a year later, when it had become the organized Republican party, it nearly elected John C. Fremont to the Presidency.

The new President was James Buchanan, by nature a conservative and a believer in the theory of states' rights. Two days after his inauguration, the Supreme Court rendered the Dred Scott decision, which declared the unconstitutionality of the Missouri Compromise and the duty of Congress to protect, not to prohibit, slavery in the territories. The storm of indignation which arose in the North gradually led the South to adopt the view that the North refused to recognize this duty of Congress, and that even squatter sovereignty should not be accepted by the South. Although Minnesota (1858) and Oregon (1859) were admitted as free states, the Southern Senators were determined to prevent the admission of Kansas under similar terms. The North was rapidly growing in population and wealth; in 1790 no greater than the South, it was now numerically nearly twice as strong. In 1859 occurred John Brown's raid at Harper's Ferry, a misguided attempt to free the slaves, which yet showed the South the dangers to which a slave population of 4,000,000 might subject the white population of only 8,000,000.

As the date of the Presidential election of 1860 drew near there was considerable evidence of the sentiment that there was no room for the South in an antislavery Union. As early as July, 1859, Senator Alfred Iverson (1798-1874) of Georgia, declared that if a Free-Soil President were elected in 1860 he would favor the formation of an independent Confederacy; and a few months later the governor of Georgia, Joseph Emerson Brown (1821-1894), announced similar views.

**Division and War.** The political campaign of 1860 is without doubt the most complicated in the history of the United States. Of the four candidates, John C. Breckinridge represented the Southern Democrats, who demanded that Congress protect slavery in the territories; Stephen A. Douglas represented the Northern

Democrats, who supported squatter sovereignty and the Compromise of 1850; John Bell was the candidate of the Constitutional Union (formerly the Know-Nothing) party, which wished to end all discussion of slavery. The fourth candidate was Abraham Lincoln, nominated by the Republicans on a platform which demanded that Congress prohibit slavery in the territories. Lincoln was elected by a large majority in the electoral college, but his popular vote was considerably less than one-half of the total. There is good basis for the statement that Lincoln was only a minority President; if the Southern states had not seceded, the Republicans in Congress would have been outvoted until the very end of his first administration. In South Carolina, after the Presidential electors were chosen by the legislature, that body remained in secession until it was evident that Lincoln would be elected. It then summoned a state convention, which at once passed an "ordinance of secession." South Carolina was followed in order by Mississippi, Florida, Alabama, Georgia and Louisiana.

In February, 1861, these states organized a separate government, the Confederate States of America, to which Texas, Arkansas, Virginia and North Carolina were admitted later in 1861. President Buchanan, though publicly denying the right of the states to secede, maintained that he had no right or power to force them to remain in the Union. Congress likewise took no action, except to admit Kansas as a free state. The only signs that the North realized the approach of a great conflict were the state elections. Most of the states, in 1860 and 1861, elected governors who proved to be strong leaders, men like John A. Andrew of Massachusetts, William Sprague of Rhode Island, William A. Buckingham of Connecticut, Andrew G. Curtin of Pennsylvania, William Dennison of Ohio, Oliver Perry Morton of Indiana, and Richard Yates of Illinois. Some of them, like Andrew and Buckingham, appreciating the situation, even ordered war supplies on their personal responsibility, pledging their private means in payment.

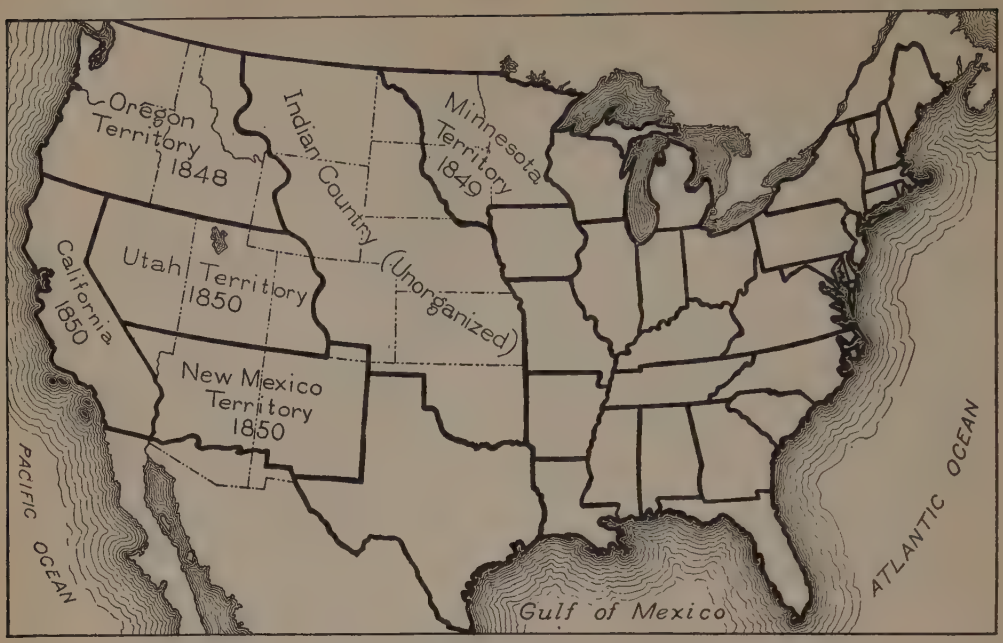
Meanwhile the Southern states were taking active steps to maintain their right to secede. Forts, arsenals and other United States property were seized by the states and later turned over to the Confederacy. During January and February the authority of the United States came to an end in seven states, and was in the balance in seven more. Lincoln, on his inauguration, found secession an accomplished fact. Efforts to furnish a basis of readjustment, such as the Crittenden Compromise, had been found useless, and it was clear that only force could hold the seceding states in the Union. In his inaugural address Lincoln said that he had "no purpose, directly or indirectly, to interfere with the institution of slavery in the states where it now exists," but he states with equal frankness that it was impossible for a state to secede. This was the situation when the attack on Fort Sumter opened the war.

For a history of the war, see WAR OF SECESSION, also the articles to which reference is made therein; for history of the South see CONFEDERATE STATES OF AMERICA and articles on the separate states.

There were many people in the North opposed to war, and this opposition increased with the failure of the Federal armies in 1861 and 1862. Some of Lincoln's acts, such as the suspension of the writ of *habeas corpus*, were extraconstitutional. The suppression of newspapers and the occasional dispersal of public gatherings, the drafting of soldiers, the heavy war taxes and the uncertain business conditions, all created an anti-war sentiment which culminated in the election of 1864, in which General George B. McClellan, the Democratic candidate, was nominated on a platform declaring the war a failure and demanding its end.

The result of the war ended for all time the right of an individual state to secede from the Union, even granted that it once possessed that right. Another great result of the war was the freeing of the slaves and the end of the institution of slavery (see EMANCIPATION PROCLAMATION). The Thirteenth Amendment, forever prohibiting slavery in the United States, was declared a part of the Constitution on December 18, 1865.

**Reconstruction.** The joy with which the end of the war was hailed in the North was succeeded by mourning on the assassination of President Lincoln by John Wilkes Booth. Andrew Johnson, who became President, tried to carry out the liberal policy of reconstruction (which see) as it had been outlined by Lincoln. Unfortunately for the South, Johnson was lacking in tact; perhaps, indeed, he lacked in statesmanship, though not in stubbornness and honorable purpose. He soon quarreled with the Republicans in Congress over the policy of reconstruction and the weight to be attached to his own wishes. The leading opponents of the President's policy were Charles Sumner and Thaddeus Stevens. The quarrel reached its




THE UNITED STATES IN 1852

The vast Western territories are indicated, with the dates of their organization as such. In the East West Virginia had not been organized, and was still a part of Virginia.

height when Johnson dismissed Edwin M. Stanton, the Secretary of War, thus violating the Tenure of Office Act, which originally had been passed over his veto. This action led to his impeachment for "high crimes and misdemeanors." The feeling in Congress was very bitter, and he was acquitted by only one vote.

At the end of his term Johnson was a political outcast; the Republicans hated him, and the Democrats would have nothing to do with him because he had deserted the party during the war. The Republicans, casting about for a suitable candidate, nominated General Grant, formerly a Democrat but allied to the Republican leaders since his break with Johnson over Stanton's dismissal. Grant's war popularity in the North and the large negro Republican vote in the "reconstructed" states gave him an easy victory over Horatio Seymour, the Democratic candidate. One event of Johnson's administration of great consequence was the purchase of Alaska from Russia in 1867.

Grant was a great soldier, but he had had no training as a politician or statesman. His two administrations, from 1869 to 1877, were troubled. The government's policy was generally controlled by self-seeking men, of little ability and occasionally even lacking in ordinary honesty. Perhaps the most important event in his first administration was the settlement of the Alabama Claims by arbitration (see ALABAMA, THE). Another notable event was the completion of the Union Pacific railroads, not, however, without scandal and corruption (see CREDIT MOBILIER). The Congressional reconstruction policy led to serious conflicts and the use of troops in the South (see FORCE BILLS; KU-KLUX KLAN). The growing discontent over the harsh reconstruction policy and the scandals affecting the Republican party led to the formation of a new party, the Liberal Republican, in 1872. The leaders of this new movement included many of the men most prominent in the old Republican party—Horace Greeley, Charles Sumner, Carl Schurz, Charles Francis Adams. Greeley was nominated for President, and this nomination was later endorsed by the Democratic convention. Grant's personal popularity, however, was sufficient to reëlect him by a large majority.

This second administration was even more stormy than the first; there was trouble on every hand. The Virginius massacre nearly caused a war with Spain, and there were constant campaigns against the Modoc and the Sioux Indians (see CUSTER, GEORGE A.). The Patrons of Industry, or Grangers, were voicing their discontent, which was not lessened by the great financial panic of 1873 and the consequent period of depression. The contro-

versy over the resumption of the specie payments, the so-called "salary grab" of 1873, by which Congress voted itself increased salaries for past services, the exposure of the "Whisky Ring" and the resignation of W. W. Balknap, Secretary of War, in order to prevent impeachment proceedings—all these events tended to discredit the administration, although there was no shadow on Grant's personal character. One of the few bright spots in these years was the Centennial Exposition in 1876.

**Economic Readjustment.** For the campaign of 1876 the Republicans nominated Rutherford B. Hayes, and the Democrats nominated Samuel J. Tilden, who had acquired national fame in the exposure of the Tweed ring in New York (see TWEED, WILLIAM M.). Tilden received a majority of the popular vote, but Hayes was declared President after a special electoral commission had investigated disputed returns from several states. Hayes's natural conservatism, added to the fact that the Democrats controlled the House, foreshadowed a new era of compromise. In accordance with his promise, Hayes ordered the withdrawal of Federal troops from the South; though there were later occasional attempts to control state elections by pressure from Washington, the withdrawal of the troops practically ended the reconstruction period. The war issues were gradually pushed aside by new political and economic problems. The President was a strong supporter of civil service reform, which was becoming a political issue, but the burning questions of the hour were monetary.

The great increase in silver production led to a decrease in the price of silver and a demand, especially from the West, that silver should be coined without restriction as to quantity (in 1873 the silver dollar had been dropped from the list of standard coins; this was the famous "crime against silver"). Congress passed the Bland-Allison Act, a compromise, over the President's veto, and in the next year specie payments were resumed without serious inconvenience. The new Greenback party, representing labor, demanded an income tax and the prohibition of Chinese labor, in addition to its fundamental principle of paper money; it polled a million votes in 1876 for Peter Cooper, but in 1880, after resumption had been successfully accomplished, its vote decreased to 300,000.

Hayes was succeeded in 1881 by James A. Garfield, another Ohioan, who had been nominated after a bitter fight between the followers of Grant, John Sherman and Blaine. Garfield's popular vote was only 7,000 more than that of General Winfield S. Hancock, the Democratic candidate, the total vote being over 9,000,000. Garfield marked his administration as independent of political rings and bosses by supporting the exposure of the star route frauds and by appointing as collector of the port of New York a man opposed by Roscoe Conkling and Thomas C. Platt, Senators from New York.

While excitement over these events was at its height, Garfield was shot by a half-crazed office seeker named Guiteau, and he died two months later. Chester Allan Arthur, who succeeded him, had not hitherto displayed any remarkably statesmanlike qualities. He now, however, held himself aloof from partisan quarrels and soon won universal respect for his fairness and ability. His term of office was noteworthy for the Edmunds Anti-Polygamy law, aimed at the Mormons, the Pendleton Civil Service law and the Chinese Exclusion Act (1882.) This last was the first law restricting the immigration of Chinese into the United States. For a number of years the United States Treasury had showed a surplus of income over expenditures. This condition led to many wasteful appropriations, which were usually passed over the President's veto, and to a demand for a lower tariff. The Tariff Act of 1883, passed in response to this demand, was still highly protective, and it seemed as though the tariff might become the chief issue of the next Presidential campaign. The Republicans, however, by nominating James G. Blaine, who was objectionable to many reformers, made the issue one of general reform. The Democrats nominated Grover Cleveland, who, as governor of New York and mayor of Buffalo, had convinced the people of his independence and of his personal integrity. After an exciting campaign, full of bitter personalities, Cleveland was elected President. Old party lines were broken by the refusal of many Republicans to vote for Blaine, and by the absence of great political questions.

*Civil Service and the Tariff.* Cleveland began his administration by extending the civil service; it is worthy of notice that one of his last important acts during this term was a further extension of the civil service to the railway mail employees. Cleveland's support of civil service won equal condemnation from his foes and from his own party; the first said he turned out too many old office holders to leave places for Democrats; the Democrats said he turned out too few. It is a fact that for the first time

since Andrew Jackson's administration the accession of a new party to power was accomplished without wholesale changes in the public service.

Important legislation was soon passed by Congress: the Edmunds-Tucker Act of 1887, dissolving the Mormon Church as a corporate body and confiscating most of its property; the Interstate Commerce Act, and the act of 1888 absolutely forbidding further immigration from China. Cleveland earned the dislike of many politicians of both parties by vetoing several hundred private bills, most of them relating to pensions. These bills were designed to help the government spend the growing surplus which had already caused extravagance during Arthur's administration. Cleveland, however, had other plans for reducing the surplus; these were embodied in the Mills Bill, a tariff bill designed to reduce the income from customs duties by $50,000,000 a year. The House of Representatives passed the bill, but the Senate, still Republican, voted against it.

The tariff became the chief issue in the campaign of 1888, in which Cleveland was defeated for reëlection by Benjamin Harrison, although Cleveland received a majority of the popular vote. The years from 1889 to 1893 were noteworthy for the Sherman Anti-Trust Act; for the repeal of the Bland-Allison Act and the substitution of the Sherman Silver Purchase Act, a compromise between the advocates of the free coinage of silver and those of the gold standard; and for the McKinley Tariff Act of 1890, establishing a high protective tariff. This law contained a provision requiring reciprocity, which was strongly advocated by James G. Blaine, then Secretary of State.

**Industrial Unrest.** The McKinley Tariff Act caused such a rapid rise in prices everywhere that the autumn Congressional elections resulted in an easy victory for the Democrats. The discontent was centered in the agricultural areas, but the mining and manufacturing districts also had their complaints. The great strike at Homestead, Pa., and the rise of the Populist, or People's, party showed the drift of affairs. Meanwhile, Congress was rapidly reducing the Treasury surplus, chiefly by doubling the amount paid in pensions. The harvest of these acts and of an unsoundness of business conditions was reaped by the new administration (Cleveland succeeded Harrison in 1893), which faced one of the greatest financial crises in the history of the United States, to be followed by four years of depression. Most of the important events of 1893 and 1894 were connected with this economic situation. Labor troubles occurred almost everywhere, the greatest of these being the Pullman and the railway employees' strike, which began at Chicago, but spread westward to San Francisco and eastward to Cincinnati.

The President and his Secretary of the Treasury, John G. Carlisle, attempted to keep the Treasury's gold reserve above the required minimum by selling bonds, and Congress was finally induced to repeal the Sherman Silver Purchase Act. The President thus succeeded in keeping silver and gold at their old ratio, but he broke the Democratic party into two wings, one favoring free coinage of silver, the other favoring the gold standard and supporting Cleveland. For a brief period it seemed as if the threatened war with Great Britain over the Venezuela Boundary dispute would become the great issue of 1896, but Great Britain's calmness in the face of Cleveland's now famous message restored quiet, and free silver became the political issue. William McKinley, the Republican candidate for President, was elected by a large vote over William J. Bryan, the Democratic candidate, and John M. Palmer, the National (gold) Democratic candidate.

**War and Prosperity.** With a Republican majority in both Houses, Congress promptly passed the highly-protective Dingley Tariff Act of 1897, which raised duties on many commodities higher than ever before and turned the deficit in the Treasury to a surplus. Another important law was the Gold Standard Act of 1900, which made the gold dollar the standard of currency. In 1898 the Hawaiian Islands, and in 1899 Tutuila and several other islands of Samoa, were annexed. The most important events of McKinley's administration were connected with the Spanish-American War. The President himself was reluctant to declare war against Spain, but the martial spirit which had seized Congress and the nation practically forced him to do so.

The causes and events of the war, as well as the problems connected with the government of the territory acquired as a result of it, are discussed in the articles on the SPANISH-AMERICAN WAR; CUBA; PHILIPPINE ISLANDS; PORTO RICO.

The acquisition of these territories was opposed by the Democrats and by some Republicans, who called themselves anti-imperialists. Imperialism became an important issue in the campaign of 1900, but a better rallying cry was the "full dinner-pail." McKinley's administra-

tion marked the end of the period of depression following the panic of 1893; the industrial and commercial expansion was phenomenal. One result of this expansion was the formation of great monopolistic corporations, popularly called "trusts;" in April, 1899, the total capitalization of the greatest trusts was double that of April, 1898. Anti-trust laws and anti-imperialism were the chief planks of the Democratic platform; the Republicans stood on their record and begged the voters to reëlect McKinley, thus assuring the continuance of the full dinner pail. McKinley was easily reëlected, but his second administration was scarcely begun when he was assassinated. Theodore Roosevelt, the Vice-President, who was immediately sworn in as his successor, retained McKinley's Cabinet and announced that he would continue his predecessor's policies.

**Progress and Reform.** It soon became apparent that Roosevelt was unlike McKinley in character and unable to adhere fully to his policies and methods. Even in foreign affairs, the new administration showed itself inclined to take short cuts and willing to make new ventures. In 1901, in connection with the attempts of Great Britain, Germany and Italy to enforce claims against Venezuela, the President announced that the United States would not protect any state against punishment, provided the punishment was deserved and did not take the form of loss of territory. In 1905, when Santo Domingo's finances were similarly involved, the President assumed control of them although the Senate refused until 1907 to confirm the treaty under which the change was made. In 1903 the isthmian canal question was settled in a direct manner essentially characteristic of Roosevelt (see PANAMA CANAL).

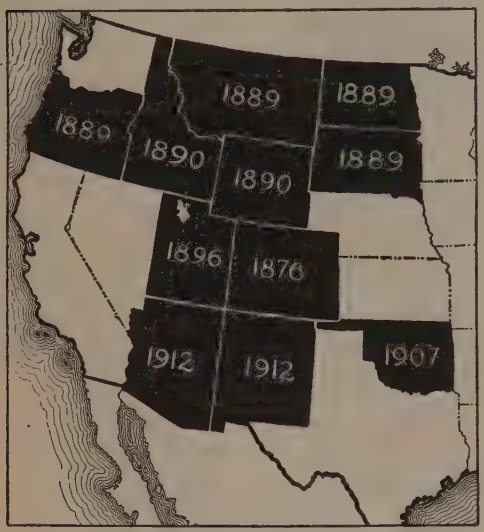
Of the other events of this administration the most important were the great anthracite coal strike of 1902, which was ended through the personal efforts of the President; the creation of the Reclamation Service in 1902 (see IRRIGATION); the Elkins Law of 1903, which increased the powers of the Interstate Commerce Commission, and the formation of the Department of Commerce and Labor in 1903. The result of the election of 1904 was never in doubt; Roosevelt was elected over Alton B. Parker by a plurality of 2,500,000 votes and by an electoral majority of nearly 200. He had proved himself a popular leader, and he exerted pressure, through his personal utterances, on legislation and other events during his term of office. The Railway Rate Regulation Act and the Federal Pure Food Act of 1906 are instances of this influence. In 1905 he was instrumental in ending the Russo-Japanese War, and shortly afterwards he sent a United States fleet on a cruise around the world.

The President's insistence on his policies led to quarrels between him and his party leaders in Congress. Speaker Joseph G. Cannon in the House, with Nelson W. Aldrich and Eugene Hale in the Senate, were the leaders of the conservative, or "stand-pat," Republicans, and they prevented the passage of most of the legislation requested by the President in the last two years of his administration. He did, however, raise a new national issue by calling attention to the crying need for conservation of natural resources, and his influence was sufficient to force the Republican national convention of 1908 to nominate his choice for President, William Howard Taft. The Republican platform endorsed the Roosevelt policies, promised a revision of the tariff, postal savings banks and more railway legislation. The Democrats again nominated William J. Bryan, on a platform which also promised tariff revision and postal savings banks, besides the application of criminal law to anti-trust cases, the adoption of an income tax and direct election of Senators.

The Republicans won by an overwhelming vote. Congress, in special session, passed the Payne-Aldrich Tariff Act (1909), which was approved by the President; only unimportant duties were lowered, and most of the duties on important commodities were raised, a general result which the country did not approve. Another incident which caused discord was the Pinchot-Ballinger controversy over the policy of conservation, resulting in serious charges against Ballinger, who was Secretary of the Interior. The growing unpopularity of the Taft administration and the reactionary character of the Republican majority in Congress led to an insurgent movement, in which the progressive Republicans united with the Democrats in 1910 to overthrow the old organization of the House of Representatives; they practically destroyed the powers which long custom had granted to the Speaker. This fight of the progressive element for a voice in affairs was a forerunner of the fall elections of 1910, which gave the Democrats a majority in the House. A spectacular feature of the campaign was Roosevelt's active participation in many states with speeches on the "new nationalism." The elections not only gave the Democrats a majority in the House, but gave them, by combination with some of

the Senators, control of the Senate. Under such circumstances the President could not force his views on Congress, and occasionally he vetoed bills. The most noteworthy acts provided for the admission of Arizona and New Mexico, for reciprocity with Canada, and for the creation of a parcel post system.

In the Republican party the antagonism of which Roosevelt had assumed the leadership came to a head in the national convention in the summer of 1912, and led to the formation of a new party, the National Progressive, which




RECENT ADMISSIONS OF STATES
Since 1876, when on August 1 Colorado was admitted to the Union as the thirty-eighth state, all the territories within the continental area have been granted statehood.

nominated Roosevelt for President and Governor Hiram Johnson of California for Vice-President. The regular Republican convention renominated Taft and James S. Sherman, the Vice-President, for reëlection, and the Democrats chose Woodrow Wilson and Thomas R. Marshall, of Indiana. The election was a Democratic victory, and Wilson tok office supported by a substantial majority in the House.

President Wilson's inaugural address made it clear that the tariff would be the first problem to be attacked. At a special session of Congress called for this purpose the President appeared in person to deliver his message, thus reviving a precedent established by Washington and John Adams. The Simmons-Underwood Tariff Act was signed by the President on October 3, 1913, fulfiling one of the pledges of the Democratic platform. Congress remained in session to consider the act reforming the currency and the banking system; and after much debate, both in and out of Congress, the act was passed by both houses during the regular session which began on December 1, and was approved by the President on December 23 (see BANKS AND BANKING).

Another act of great importance was approved by the President on June 15, 1914—the repeal of the provision in a law of 1912 by which American-owned ships were exempt from tolls on the Panama Canal. The repeal was due chiefly to the continued efforts of the President. In foreign relations the personality of the President made itself felt as distinctly as in domestic affairs. Because of Japan's protests he made an earnest attempt to prevent the passage of an alien land bill in California (subhead *History*). Towards Mexico he preserved a policy to which the public gave the name of "watchful waiting." This refusal to recognize General Huerta as President of Mexico was one of the reasons for Huerta's eventual elimination. In spite of clamor the President refused to be drawn into a war with Mexico, notwithstanding the insolent attitude of that country through three years of patient endeavor to bring order to the distracted republic. In 1916 the President's attitude seemed fully justified when the Carranza government appeared to have begun to "set Mexico's house in order."

**The War of the Nations.** The outstanding event in the history of the modern world was the beginning of the war which convulsed Europe in 1914. During its early months the United States viewed it with little personal interest beyond proclamations of neutrality and a sincere official effort to enforce throughout the country a neutral attitude. Europe ordered vast quantities of munitions in America and also sought foodstuffs; an era of prosperity dawned for those who had wares to sell, but the cost of living soared to heights not known before for fifty years. Had the effect of the European conflict not gone farther it would have had a serious effect in America, but the United States was destined to play a leading part in the gigantic struggle.

Germany's failure to end the war speedily, or at least to win a decidedly favorable turn, by the capture of Paris in the first month of the conflict led by degrees to a war policy not countenanced by the laws of nations. The United States inevitably suffered when the central powers ignored the just claims of neutrals. The President was reëlected in 1916 on

his record that he had "kept us out of war;" before his inauguration war became an alarming possibility, and early in April, 1917, in an address to Congress which recited the wrongs the country had suffered, the President asked for a declaration of war against the German Empire. Four days later, on April 6, the United States was officially one of the allies and the enemy of Germany. W.F.Z.

The story of the participation of the United States in the war is given in the article WAR OF THE NATIONS.

Consult, for brief references, such school histories as are found in every community. For extended reading the following are recommended: Becker's *Beginnings of the American People;* Lodge's *Short History of the English Colonies in America;* Thwaite's *The Colonies;* McElroy's *Winning of the Far West;* Fisher's *True History of the American Revolution;* Fish's *Development of American Nationality;* Bradford's *Confederate Portraits* and his *Union Portraits;* Beard's *Contemporaneous American History.*

**Related Subjects.** The following index will simplify reference to the numerous topics in these volumes which have to do, directly or indirectly, with the United States. The articles on the various states have also lists of related subjects.

CANALS

Cape Cod
Chesapeake and Ohio
Chicago Drainage
Erie
Hennepin
Illinois and Michigan
New York State Barge Canal
Panama
Sault Sainte Marie

CITIES AND TOWNS

See lists under state articles.

EDUCATION

See article EDUCATION, with *Related Subjects* index; also subhead *Education* in state articles.

GOVERNMENT

Attorney-General
Australian Ballot
Ballot
Cabinet
Citizen
Civil Service
Commerce, Department of
Committee of the Whole
Congress of the United States
Constitution of the United States
Consul
Courts
Customs Duties
Dead-Letter Office
Diplomacy
Education, subtitle *Bureau of Education*
Electoral College
Governor
Income Tax
Initiative and Referendum
Interior, Department of the
Justice, Department of
Justice of the Peace
Labor, Department of
Law
Mint
Naturalization
Navy, Department of the
Postoffice Department
President of the United States
Primary Election
Probate
Recall
Representatives, House of
Republic
Sanitary Science
Secret Service
Senate
Single Tax
Speaker
State
State, Department of
Suffrage
Supreme Court
Tariff
Tax and Taxes
Treasury
Veto
Vice-President
War, Department of
Weather Bureau
Woman Suffrage

GULFS AND BAYS

California, Gulf of
Chesapeake Bay
Delaware Bay
Florida, Gulf of
Long Island Sound
Mexico, Gulf of
Narragansett Bay
Puget Sound

HISTORY

Alabama, The
Alamo
Albany Convention
Alien and Sedition Laws
Annapolis Convention
Antietam, Battle of
Articles of Confederation
Bacon's Rebellion
Bering Sea Controversy
Blue Laws
Boston Massacre
Boston Port Bill
Boston Tea Party
Brandywine, Battle of the
Bull Run, Battles of
Bunker Hill, Battle of
Carpetbaggers
Cerro Gordo, Battle of
Chancellorsville, Battle of
Chapultepec, Battle of
Charter Oak
Chattanooga, Battle of
Chickamauga, Battle of
Churubusco, Battle of
Clayton-Bulwer Treaty
Committees of Correspondence
Compromise of 1850
Confederate States of America
Continental System
Crittenden Compromise
Declaration of Independence
Dorr's Rebellion
Dred Scot Decision
El Caney, Battle of
Emancipation Proclamation
Fair Oaks, Battle of
Federalist, The
Fifteen Decisive Battles
Filibusters
Five Forks, Battle of
Force Bills
Fort Duquesne
Fort Henry and Fort Donelson
Fort Mims, Massacre of
Fort Monroe
Fort Moultrie
Fort Niagara
Fort Sumter
Fredericksburg, Battle of
Freedmen's Bureau
French and Indian Wars
Fugitive Slave Laws
Gadsden Purchase
Geneva Arbitration
Geneva Convention
Germantown, Battle of
Gerrymander
Gettysburg, Battle of
Ghent
Grandfather's Clause
Green Mountain Boys
Guadalupe Hidalgo, Treaty of
Guilford, Battle of
Hampton Roads Conference
Hartford Convention
Hay-Pauncefote Treaty
Hessians
Intolerable Acts
Jay Treaty
Kansas-Nebraska Bill
Kenesaw Mountain, Battle of
Kentucky and Virginia Resolutions
Kitchen Cabinet
Ku-Klux Klan
Lecompton Constitution
Lexington, Battle of
Liberty Bell
Lookout Mountain
Louisburg
Louisiana Purchase
Lundy's Lane, Battle of
Malvern Hill, Battle of
Manila Bay, Battle of
Marengo, Battle of
Mason and Dixon's Line
Mason and Slidell
Massachusetts Bay Colony
Mayflower

Mecklenburg Declaration of Independence
Mexican War
Minutemen
Missouri Compromise
Mobile Bay, Battle of
Monitor and Merrimac
Monmouth, Battle of
Monroe Doctrine
Monterey, Battle of
Murfreesboro, Battle of
Nat Turner Insurrection
Navigation Acts
New England Confederation
Nullification
Omnibus Bill
Orders in Council
Ordinance of 1787
Palo Alto, Battle of
Paris, Treaties of
Patroon System
Perryville, Battles of
Petersburg, Siege of
Pilgrims
Plymouth Colony
Princeton, Battle of
Puritans
Quebec, Battle of
Queenston Heights, Battle of
Raisin River, Massacre of
Reconstruction
Resaca de la Palma, Battle of
Revolutionary War in America
Salary Grab
San Jacinto, Battle of
Santiago, Battle of
Saratoga, Battles of
Shays' Rebellion
Shiloh, Battle of
Slavery
Spanish-American War
Specie Payments, Resumption of
Spoils System
Spottsylvania Court House, Battle of
Stamp Act
Star Routes
States' Rights
Thames River, Battle of the
Ticonderoga, Battles of
Tippecanoe, Battle of
Trent Affair, The
Trenton, Battle of
Underground Railroad
Valley Forge
Virginius Massacre
War of 1812
War of Secession
War of the Nations
Washington, Treaty of
Watauga Association
Webster-Ashburton Treaty
Western Reserve
Whisky Insurrection
Whisky Ring
Wildcat Banks
Wilderness, Battle of the
Wilmot Proviso
Writ of Assistance
Wyoming Valley Massacre
Yorktown, Sieges of
X Y Z Correspondence

ISLANDS

See *Related Subjects* with article ISLAND.

LAKES

See *Related Subjects* with article LAKE.

LEADING PRODUCTS

See this heading in *Related Subjects* indexes under the various state articles.

MILITARY AND NAVAL LEADERS

Allen, Ethan
Arnold, Benedict
Bainbridge, William
Banks, Nathaniel Prentiss
Barron, James
Beauregard, Pierre Gustave Toutant
Bragg, Braxton
Breckenridge, John Cabell
Burnside, Ambrose Everett
Butler, Benjamin F.
Custer, George Armstrong
Dearborn, Henry
Decatur, Stephen
De Kalb, Baron
Dewey, George
Dix, John Adams
Early, Jubal Anderson
Evans, Robley Dunglison
Farragut, David Glasgow
Floyd, John Buchanan
Foote, Andrew Hull
Funston, Frederick
Gates, Horatio
Goethals, George Washington
Gordon, John Brown
Grant, Frederick Dent
Greene, Nathanael
Hale, Nathan
Hampton, Wade
Hancock, Winfield Scott
Hazen, William Babcock
Hobson, Richmond Pearson
Hood, John Bell
Hooker, Joseph
Houston, Sam
Hull, William
Jackson, Thomas Jonathan
Johnston, Albert Sydney
Johnston, Joseph Eggleston
Jones, John Paul
Knox, Henry
Lawrence, James
Lawton, Henry Ware
Lee, Charles
Lee, Henry
Lee, Robert Edward
Longstreet, James
McClellan, George Brinton
Mahan, Alfred Thayer
Marion, Francis
Meade, George Gordon
Miles, Nelson Appleton
Morgan, John Hunt
Mosby, John Singleton
Moultrie, William
Pemberton, John Clifford
Perry, Matthew Calbraith
Perry, Oliver Hazard
Pershing, John J.
Pickens, Andrew
Pickett, George Edward
Pike, Zebulon Montgomery
Polk, Leonidas
Porter
Price, Sterling
Putnam, Israel
Rosecrans, William Starke
Saint Clair, Arthur
Sampson, William Thomas
Schley, Winfield Scott
Schofield, John McAllister
Schuyler, Philip
Scott, Hugh Lenox
Scott, Winfield
Semmes, Raphael
Shafter, William Rufus
Sheridan, Philip Henry
Sherman, William Tecumseh
Sigsbee, Charles Dwight
Sims, William Sowden
Smith, Edmund Kirby
Stark, John
Steuben, Baron von
Stuart, James Ewell Brown
Thomas, George Henry
Warner, Seth
Warren, Joseph
Wayne, Anthony
Wheeler, Joseph
Wilkes, Charles
Winslow, John Ancrum
Wood, Leonard
Worden, John Lorimer

MOUNTAINS

Adirondack
Alleghany
Appalachian
Berkshire Hills
Black
Black Hills
Blue Ridge
Cascade Range
Catskill
Coast Range
Cordillera
Cumberland
Green
Holyoke, Mount
Hood, Mount
Iron
Katahdin
Ozark
Pike's Peak
Rainier, Mount
Rocky
Shasta, Mount
Sierra Nevada
Stone Mountain
Taconic
Uinta
Wasatch
White
Whitney, Mount

OUTLYING POSSESSIONS

Alaska
Guam
Hawaii
Philippine Islands
Porto Rico
Samoa
Virgin Islands

PRESIDENTS

Adams, John
Adams, John Quincy
Arthur, Chester A.
Buchanan, James
Cleveland, Grover
Fillmore, Millard
Garfield, James A.
Grant, Ulysses S.
Harrison, Benjamin

Harrison, William Henry
Hayes, Rutherford B.
Jackson, Andrew
Jefferson, Thomas
Johnson, Andrew
Lincoln, Abraham
McKinley, William
Madison, James
Monroe, James
Pierce, Franklin
Polk, James K.
Roosevelt, Theodore
Taft, William H.
Taylor, Zachary
Tyler, John
Van Buren, Martin
Washington, George
Wilson, Woodrow

RIVERS

Alabama
Allegheny
Apalachicola
Arkansas
Atchafalaya
Bighorn
Brazos
Canadian
Chattahoochee
Chickahominy
Colorado
Columbia
Connecticut
Coosa
Cumberland
Delaware
Detroit
East
Genesee
Gila
Great Kanawha
Green
Housatonic
Hudson
Humboldt
Illinois
James
Kansas
Kennebec
Kentucky
Lackawanna
Lehigh
Mackenzie
Merrimac
Minnesota
Mississippi
Missouri
Mobile
Mohawk
Monongahela
Niagara Falls and River
Ohio
Pecos
Penobscot
Platte
Potomac
Rappahannock
Raritan
Red
Red River of the North
Rio Grande
Roanoke
Rock
Sabine
Saco
Sacramento
Saint Lawrence
Saint Mary's
San Joaquin
Savannah
Schuylkill
Scioto
Shenandoah
Snake
Susquehanna
Tennessee
Tombigbee
Wabash
Washita
White
Willamette
Wisconsin
Yazoo
Yellowstone

STATES

Alabama
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
Florida
Georgia
Idaho
Illinois
Indiana
Iowa
Kansas
Kentucky
Louisiana
Maine
Maryland
Massachusetts
Michigan
Minnesota
Mississippi
Missouri
Montana
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Ohio
Oklahoma
Oregon
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
West Virginia
Wisconsin
Wyoming

STATESMEN

Adams, Charles Francis
Adams, Samuel
Aldrich, Nelson Wilmarth
Allison, William Boyd
Altgeld, John Peter
Bayard, Thomas Francis
Bell, John
Benjamin, Judah Philip
Benton, Thomas Hart
Blaine, James Gillespie
Bland, Richard Parks
Bryan, William Jennings
Burlingame, Anson
Burr, Aaron
Calhoun, John Caldwell
Cannon, Joseph G.
Carroll, Charles
Cass, Lewis
Chase, Salmon Portland
Clark, Champ
Clay, Henry
Clinton, De Witt
Clinton, George
Colfax, Schuyler
Conkling, Roscoe
Cullom, Shelby Moore
Cummins, Albert Baird
Davis, Jefferson
Douglas, Stephen Arnold
Edmunds, George Franklin
Ellsworth, Oliver
Evarts, William Maxwell
Everett, Edward
Fairbanks, Charles Warren
Floyd, John Buchanan
Folk, Joseph Wingate
Foster, John Watson
Franklin, Benjamin
Gallatin, Albert
Gerard, James Watson
Hamilton, Alexander
Hamlin, Hannibal
Hancock, John
Hanna, Marcus Alonzo
Hay, John
Hayne, Robert Young
Hendricks, Thomas Andrews
Henry, Patrick
Hewitt, Abram Stevens
Hill, David Bennett
Hoar, George Frisbie
Hughes, Charles Evans
Ingalls, John James
Jay, John
Johnson, Hiram W.
Johnson, Richard Mentor
Kendall, Amos
King, William R.
Knox, Philander Chase
La Follette, Robert Marion
Laurens, Henry
Lee, Richard Henry
Lincoln, Robert T.
Logan, John Alexander
Mallory, Stephen Russell
Marshall, Thomas Riley
Morgan, John Tyler
Morris, Gouverneur
Morton, Julius Sterling
Morton, Levi Parsons
Morton, Oliver Perry
Olney, Richard
Otis, James
Parker, Alton Brooks
Pinckney, Charles Cotesworth
Platt, Thomas Collier
Quincy, Josiah
Randolph, John
Rankin, Jeannette
Reagan, John Henninger
Reed, Thomas Brackett
Root, Elihu
Rutledge, John
Schurz, Carl
Seward, William Henry
Sherman, James Schoolcraft
Sherman, John
Sherman, Roger
Smith, Hoke
Stanton, Edwin McMasters
Stephens, Alexander Hamilton
Stevens, Thaddeus
Stevenson, Adlai Ewing
Sumner, Charles
Tilden, Samuel Jones
Tillman, Benjamin Ryan
Toombs, Robert
Trumbull, Jonathan
Tweed, William Marcy
Underwood, Oscar
Washburne, Elihu Benjamin
Watson, Thomas E.
Weaver, James Baird
Webster, Daniel
Welles, Gideon
Wheeler, William Almon
Williams, John Sharp
Wilson, Henry
Wilson, William Lyne
Yates, Richard

# *OUTLINE AND QUESTIONS ON THE UNITED STATES*

## *Outline*

### I. Location

(1) Latitude, 25° to 49° north
(2) Longitude, 67° to 125° west
(3) Position as compared with European nations
(4) Boundaries
  (a) Natural
  (b) Political
    1. Relation with Canada
    2. Relation with Mexico

### II. Size

(1) East and west breadth, 3,100 miles
(2) Greatest north and south extent, 1,780 miles
(3) Actual area
  (a) Continental, excluding Alaska, 3,026,789 square miles
  (b) Including all outlying possessions, 3,743,445 square miles
(4) Area compared with that of other countries
  (a) Canada
  (b) European countries
(5) Area of separate states

### III. Geographic Features

(1) Coast line
  (a) Great length in proportion to area
  (b) Effect of movements of coast regions on number of harbors
(2) Surface features
  (a) Atlantic coastal plain
    1. Narrow in north, widening toward south
    2. The fall line
  (b) Appalachian highland
    1. The Piedmont
    2. The Blue Ridge
    3. The Great Valley
    4. The Alleghany-Cumberland belt
  (c) Interior plain
    1. Absence of great heights
    2. General fertility
  (d) Cordilleran highland
    1. Rocky Mountains
    2. Lofty western plateau
  (e) Pacific slope
    1. Pacific valleys
    2. Coast ranges
(3) River systems
(4) Lakes
(5) Climate
  (a) Conditions due to latitude
  (b) Effect of mountain ranges
    1. Sharper variations from east to west than from north to south
  (c) Rainfall
    1. Effect of mountain barriers
  (d) Effect of climate on plant and animal life

### IV. The People

(1) Population
  (a) Density in entire country
  (b) Where greatest density
(2) Origin of foreign-born population
(3) Immigration
(4) Indians and negroes
(5) Religion
  (a) Statistics concerning strongest sects
(6) Education
  (a) Growth of public school systems
  (b) State systems
(7) Chief cities

### V. Resources and Industries

(1) Furs
  (a) Importance in early history of country
  (b) Predominance of Alaska
(2) Fish
  (a) Atlantic coast
  (b) Southern coast
  (c) Pacific coast
  (d) Interior fishing
(3) Forest resources
  (a) Original forest areas
  (b) Destruction of timber
  (c) Forest conservation
(4) Minerals
  (a) Structural materials
  (b) Fertilizers
  (c) Metals
    1. Precious metals
    2. Industrial metals
  (d) Fuels
    1. Coal
    2. Oil
    3. Gas
(5) Agriculture
  (a) North Atlantic section
    1. Dairying leading farm industry

## *Outline and Questions on the United States—Continued*

2. Influence of great cities on determining character of crops
(b) The South
1. "King Cotton"
2. Other important crops
(c) North-central section
1. Great grain-growing region
2. Other crops
3. Stock raising and dairying
(d) Mountain states
1. Stock raising
2. Irrigation
3. Dry farming
(e) Pacific Slope
1. Diversified farming
(6) Manufacturing
(a) Water power
(b) Electricity and gas
(c) Factors determining location of manufactures
(d) Classes of articles made

### VI. Transportation and Commerce

(1) Travel by trails
(2) River travel
(a) Introduction of the steamboat
(3) Canals
(4) Railways
(5) Coastwise trade
(6) Foreign commerce
(a) Early exports of raw material
(b) Growth of trade

### VII. Government

(1) A *Federal* government
(2) The three departments
(3) State and local government
(a) Powers reserved to states
(4) Territories and dependencies
(a) How acquired
(b) How governed

### VIII. History

(1) Discovery and exploration
(2) Early settlements
(a) French
(b) Spaniards
(c) English
(3) Growth of thirteen colonies
(a) Differing factors in development
(4) Struggle between France and England
(a) England supreme in North America
(5) Revolutionary War
(a) Causes
(b) Events
1. Military
2. Political
(c) Results
(6) Articles of Confederation
(a) Why a failure
(7) The Constitution adopted
(8) Federal supremacy
(9) Growth of democracy
(10) War of 1812
(11) New issues and parties
(a) Tariff
(b) Slavery
(12) Jackson and Van Buren
(13) Harrison and Tyler
(14) Polk
(15) Taylor
(16) Slavery the great issue
(17) Division and War of Secession
(a) Causes
(b) Events
(c) Results
(18) Reconstruction
(19) Economic readjustment
(20) Industrial unrest
(21) Spanish-American War
(22) Progress and Expansion
(23) The Mexican trouble
(24) War of the Nations

## *Questions*

How does the United States compare in area with the smallest of the continents? With the next to the smallest?

How does it compare in population with each of these?

What boast of Great Britain which refers to the extent of its territories is equally true with reference to the United States?

How far is the southernmost point of the United States from the tropics?

Which is the largest of the outlying possessions of the United States? Which has been in the possession of the country longest?

Which of these dependencies is farthest from the United States? Which is nearest to it?

Why did the United States from the first have so much closer relations with Europe than with the countries west of the Pacific?

## *Outline and Questions on the United States—Continued*

What agreement exists between the United States and its northern neighbor as to fortifications on the border line?

Why have relations with Mexico never been as close and as friendly as relations with Canada?

What railroad outside of the territory of the United States had a great part in the development of the Pacific slope? How?

Why is it unlikely that the Panama Canal will offer any special advantages to the Eastern countries of South America?

What facts of importance in the commercial life of the country are due to the fact that the north Atlantic coast has sunk and the South Atlantic coast has risen within comparatively recent geologic time?

What is the "fall line," where does it occur, and what effect has it had on the location of cities?

Where is the Great Basin? How does its drainage differ from that of most other parts of the country?

Why do east and west mountain ranges cause greater variations in temperature than do north and south ranges?

Why do mountains of the latter type have a greater effect on distribution of rainfall?

Who said that New England had no climate, but merely samples of weather, and what did he mean by it?

What is the special, determining feature of a cyclonic storm?

How did immigration into the United States between 1840 and 1890 differ in character from that of the later decades?

Show by figures how the outbreak of the War of the Nations affected immigration into the United States.

How did the attitude of the southern colonies toward education in the years before the Revolution differ from that of the northern colonies?

What two natural resources first attracted adventurers and settlers to the northern parts of North America?

What is "the only considerable food supply still furnished freely by nature?"

What natural causes and what desire of man may have had to do with the fact that the western part of the United States was largely without forest cover?

Why is the state and not the individual the natural and proper source of any forest conservation movements?

How is the vast importance attached to the industrial metals shown in naming eras of civilization? What do you know about the dates or duration of such eras?

What is the most important industrial metal? Which ranks next?

What effect did the early agricultural tendencies in the South have on the growth of an institution that later played a large part in history?

What is meant by dry farming, and where is it chiefly practiced in the United States?

Who, so far as is known, established the first colony within the present limits of the United States? Who established the first permanent colony?

What colonies were founded by seekers after religious freedom?

What claims of the French and English made it absolutely impossible that these colonies should exist and develop side by side in North America? (See FRENCH AND INDIAN WARS.)

What was the last state to ratify the Federal Constitution?

**UNITED STATES INDIAN TRAINING AND INDUSTRIAL SCHOOL,** the largest and best known school for American Indians, was founded at Carlisle, Pa., in 1879. Its organization was the result of the interest taken in Indian war prisoners confined in Fort Monroe, at Saint Augustine, Fla. In 1875 public-spirited women of that city established a school where the prisoners were taught to read and write English, and after their release several of the students expressed a desire for further advantages. These were admitted to Hampton Institute, but it was soon deemed advisable to establish a new school for Indians alone. Accordingly an abandoned army post at Carlisle was provided by the Federal government, and work was begun under the supervision of Captain R. H. Pratt of the United States army.

The institution has developed along practical lines. Besides the usual academic courses in language, history, literature, science and mathematics, there are business, music, art and industrial courses, the latter offering instruction in sixteen trades (for boys) and the household arts. Students are permitted to work in homes of white families, and the wages they earn during that time are placed in the school bank, to become their capital when school days are over. Attention is also paid to athletics, and the football teams of the "Carlisle Indians" have gained many honors for the school. Many of the graduates return to their own people to become teachers and leaders, and the majority become self-supporting. The faculty numbers about sixty-five and the student body is over 750. There is a library of 4,000 volumes.

**UNITED STATES MILITARY ACADEMY.** See MILITARY ACADEMY, UNITED STATES.

**UNITED STATES NAVAL ACADEMY.** See NAVAL ACADEMY, UNITED STATES.

**UNITED STATES STEEL CORPORATION,** the largest industrial corporation in the world, was organized in 1901 under the leadership of J. Pierpont Morgan (1837-1913). It represented the consolidation of a number of powerful industrial corporations, including the Carnegie, the Federal Steel, the National Tube, the American Steel and Wire, the National Steel and the American Tin Plate companies. In the process of organization the Rockefeller ore mines and ore-carrying fleet were purchased, and when the gigantic organization was ready to place its stock on the market its capital was fixed at more than a billion dollars, in addition to $366,000,000 of bonded and mortgage debt. The corporation was chartered under the laws of the state of New Jersey. Judge Elbert H. Gary was made chairman of the board of directors and Charles M. Schwab was chosen president; among other prominent officials were Abram S. Hewitt and George W. Perkins.

It is difficult to visualize the holdings and operations of this mighty corporation. It owns the largest American fleet of ships under one management, hundreds of miles of railroad trackage, scores of blast furnaces, whose fires burn day and night, and iron-ore mines of untold value. In the words of one of its historians, "It makes more steel than either Great Britain or Germany, and one-quarter of the total amount made in all the countries of the world. To feed its ceaseless fires it burns in a single year ten million tons of coal, eleven million tons of coke, and fifteen billion cubic feet of natural gas. It can make anything in steel from a carpet tack to steel rails, from a tin can to armor plate, from a wire nail to an Eiffel Tower."

The United States Steel Corporation has a commendable reputation in regard to treatment of employees, interesting thousands of them in the purchase of shares of stock. On the other hand, it has been accused of unlawfully restricting competition, and in 1911 the United States government brought suit to dissolve it on the ground of violating the provisions of the Sherman Anti-Trust Law. In June, 1915, a decision in favor of the corporation was handed down by the United States District Court at Trenton, N. J., and in October the government filed an appeal to the United States Supreme Court.

**UNITED WORKMEN,** ANCIENT ORDER OF. See ANCIENT ORDER OF UNITED WORKMEN.

**UNIVERSALISTS,** *u ni ver' sal ists,* the name applied to those who believe in the ultimate salvation of all mankind. They reason to this belief from the premise that Truth and Righteousness are the controlling powers in the universe. From this it follows that Good must finally triumph over Evil, and so all men must ultimately be brought into harmony with God. As a belief Universalism has an important place in the thought of the Christian world to-day, and it has been taught in one form or another almost from the founding of the Christian Church.

There is an organized Universalist Church, the members of which are found chiefly in the United States and Canada. The first attempts at establishing the denomination were made late in the eighteenth century in Massachu-

setts, under the direction of an English clergyman, John Murray, and the present plan of organization was adopted at the Centennial Convention, held in 1870. The local parish is the unit, and the states are organized as independent federations. The supreme legislative body is the general convention, composed of representatives elected by the several states. Members of this Church subscribe to belief in the following elements of its creed:

The Universal Fatherhood of God; the spiritual authority and leadership of His Son, Jesus Christ; the trustworthiness of the Bible as containing a revelation from God; the certainty of just retribution for sin; the final harmony of all souls with God.

There are about 55,000 members of the Universalist denomination in the United States, and about 2,000 in Canada.

Consult Fisher's *Brief History of the Universalist Church;* Campbell's *The New Theology.*

**UNIVERSE,** *u'ni vers,* the works of creation taken as a whole. The universe has not been for man a constant thing, but has expanded constantly to keep pace with his expanding knowledge. He once regarded the inconsiderable planet which he inhabits as the center of the universe and believed that the majestic sun, the moon and the stars revolved about him. A more rational conception that owes its development to such thinkers as Pythagoras, Copernicus, Galileo, Kepler and Newton has finally shaped itself down the ages, until it is now known that the sun is the center of a system about which the earth, with the other planets and the asteroids, revolves. But the sun itself is lost in the unthinkable immensity of space, being but a single star among countless millions. Science, in revealing truth after truth about the universe, has finally produced a conception of its vastness that staggers the mind.

**Related Subjects.** From the following articles in these volumes the reader may gain some idea of how modern scientists regard the universe:

| | |
|---|---|
| Asteroids | Planet |
| Astronomy (with list) | Solar System |
| Earth | Star |
| Moon | Sun |
| Nebular Hypothesis | |

**UNIVERSITY,** *u ni ver'si ti,* an educational institution for the most advanced instruction or for the examination of students who have received such instruction. It has authority to confer degrees that are recognized throughout the civilized world. Strictly speaking, a university is of higher grade than a college, and requires either graduation from a college of regular standing or at least two years of college work or the equivalent of these courses for admission to its classes. Such a university maintains a college of liberal arts, and faculties of medicine, law and engineering. To these the larger universities add faculties of science, mathematics, theology (excepting state universities), schools of education and commerce, while some have schools of music, agriculture or journalism.

In the United States the term *university* is used very loosely, and not a few institutions call themselves universities whose work is scarcely more advanced than that of the average high school. Such a use of the term is misleading. It causes those unacquainted with these self-styled universities to believe them to be institutions of superior instruction, and it causes others to place a low estimate upon the work and value of the real university. Some institutions calling themselves universities are in reality colleges. Their requirements for admission are the completion of a four years' high school course or its equivalent, and their courses are the same as those offered in the undergraduate school of the university. They have no faculties of law, medicine, theology or other professions. There are, however, some

colleges, of which Dartmouth is a striking example, that are organized as universities.

The universities of the United States may be classified under two divisions—endowed universities and state universities.

**Endowed Universities.** Most of the endowed universities began as colleges. The most conspicuous examples of these are Harvard, Yale, Columbia (formerly King's College) and Princeton, each of which is described under its title. The University of Chicago, Johns Hopkins and Leland Stanford Junior were founded directly upon endowments. The support of endowed universities is derived from interest on an endowment fund, tuition and gifts. Those mentioned above are amply equipped in buildings, laboratories and libraries, and their faculties contain specialists of world-wide reputation, who are capable of giving instruction of the highest order, and of conducting the students along the lines of original research which they have respectively chosen.

The management of an endowed university is vested in a board of trustees, which may be a self-perpetuating body or may receive its new members by election by the alumni. This board manages the financial affairs of the institution, engages the president and members of the faculty on his recommendation, approves the courses of study, and fixes, on the president's recommendation, the requirements for graduation from the various departments and for conferring different degrees. The president represents the faculty at the meetings of the board, and the board at the meetings of the faculty; in other words, he is the means of communication between the two bodies. In the large universities each department is presided over by a dean, who looks after the interests of the department, and reports to the president at stated intervals. The president is the general manager and often is under the necessity of giving much of his time to raising money for the institution. Because of the great responsibility and many duties resting upon him, he is unable to give his time to the detailed management of departments.

**State Universities.** These universities are organized by acts of the legislatures, and they derive their support from land grants made by Congress for the purpose, and from direct appropriations by the states. State universities have been founded in all the states west of New York and in a number of the older states. In many states the agricultural college is connected with the university, but in others it has no such connection. The organization and management of state universities and the courses of study offered are about the same as those of the endowed universities, with the following exceptions: a state university maintains no school of theology, and the board of trustees is appointed by the governor of the state or is chosen by the legislature. In most states the governor and superintendent of public instruction are members of the board. Many state universities have well-organized extension departments (see *University Extension*, below). In Minnesota all high schools are directly affiliated with the state university; in many states official visitors recommend high schools for university affiliation. Each state university is described in these volumes under its title.

**European Universities.** Among the most noted universities in the world are those of Cambridge and Oxford in England, and those of Paris, Bologna, Jena, Berlin, Heidelberg, Vienna, Edinburgh and Dublin. These are described in these volumes under their respective titles, and no detailed description is necessary here. They were originally organized according to two plans, of which the University of Bologna and the University of Paris are types. The former consisted of bands of students, and the latter of an organization of teachers. The Bologna plan was followed by all the universities of Southern Europe, and the Paris plan by those in Northern Europe until comparatively recent times.

**Canada.** Higher education has always received its full share of attention in Canada, and with the opening up of the new provinces in the West the number of colleges and universities has increased materially. The four Western provinces have all established provincial universities, while the more important of the endowed institutions are to be found in the older Eastern sections. Of the universities of the Dominion the chief ones are those of British Columbia, Alberta, Saskatchewan and Manitoba; and Toronto, McGill, Queen's, Laval, Acadia and Dalhousie. For more detailed information the reader may consult the articles on those institutions and the subhead *Education* in the articles on Canada and on the various provinces. A.C.

**Related Subjects.** In the *Related Subjects* index at the close of the article EDUCATION is given a list of all the universities treated in these volumes.

Consult Gilman's *University Problems;* Thwing's *History of Higher Education in the United States;* Slosson's *Great American Universities.*

## *University Extension*

By university extension is meant an educational movement designed to bring the advantages of higher institutions of learning to all the people. There are three plans for extension work, all of which may be carried on by one institution at the same time; they are home lecture courses, home study classes and correspondence courses.

By the first plan the people in any community desiring courses of lectures may organize, decide upon the line of study to be pursued and apply to the nearest extension center for lecturers. The university furnishes copies of a syllabus containing an outline of each lecture, together with suggestions and references for study. In some instances small traveling libraries are sent upon request. The lecturer conducts a class exercise or "quiz," either before or after each lecture, and those desiring credits at the university are required to do a specified amount of reading and at the end of the course to take an examination or submit a thesis for criticism. There may be six, ten or twelve lectures in a course, one being delivered each week. The expense is borne by the community, and is usually met by the sale of tickets. While only a small proportion of those attending the lectures do the work required for credits, the discussion in the community of any subject of general interest by an eminent authority produces a highly-beneficial effect.

Study classes are organized in larger cities in which the university is located, and in other localities within easy reach. They are designed for those who cannot attend the regular classes of the university, and are held evenings and on Saturdays. Most of the attendants upon these classes are teachers. Correspondence courses enable students to do a part of the work required for a degree by correspondence. See SCHOOL, subhead *Correspondence Schools.*

University extension had its origin in the great English universities of Cambridge and Oxford. In 1850 the University of Oxford began to conduct local examinations for those who were not regular students. In 1866 Prof. James Stuart of Cambridge began giving courses of lectures before organizations in other cities. He gradually associated other members of the faculty with himself, and in 1873 both Cambridge and Oxford adopted extension work. The movement received formal recognition in America in 1890, when the American Society for the Extension of University Teaching was organized and the work was begun by the University of Pennsylvania. The following year the state of New York appropriated $10,000 for organizing and supervising extension work. When the University of Chicago was organized, the most complete extension department in America was included in its plan. From these three centers university extension work has spread over the United States and Canada.

The leading state universities have extension departments, which are usually in charge of the college of agriculture. The University of Wisconsin has organized and put into operation a plan that systematically covers the entire state. Provision is made for a representative of the university in every part of the state. This representative supervises correspondence work, gives lectures and conducts classes as occasion may require. The greater part of the work is vocational, and the leading industries of the locality are given special attention by the local representatives. In all localities special emphasis is laid upon home economics. Some normal schools and other schools for secondary education also have extension departments.

The leading universities of Canada have well-organized extension departments. Those of the Eastern provinces have more requests for work in the liberal arts, but in the newer provinces vocational subjects, especially agriculture and home economics, are the topics receiving greatest attention. W.F.R.

Consult "University Extension in the United States," in *Bureau of Education Bulletin No. 9.*

**UNTER DEN LINDEN,** *oon'ter dane lin' den* (literally, *under the lindens*), the most famous street in Berlin, and one of the finest avenues in the world. It takes its name from the two beautiful rows of linden trees, interspersed with chestnuts, between which runs a wide gravel promenade, flanked by rows of benches on which a pedestrian may rest, provided he is able to pay the required fee of five pfennigs (about one cent) for the privilege. The proceeds of this fee are applied to the upkeep of the street.

On both sides of this linden-shaded promenade are driveways, the total width, from curb to curb, being 196 feet. The avenue is only two-thirds of a mile long, extending from the palace of Emperor William II to Brandenburg Gate. In this short distance are located the finest hotels, shops and cafés, the royal opera house, the

palace of Emperor William I, the University of Berlin, the Arsenal, the French and British embassies, and other important buildings. Through the Brandenburg Gate are five passageways, the center one being reserved by courtesy for use of the royal family only.

For additional details and setting of this avenue in the scheme of city building, see BERLIN. The Brandenburg Gate is shown in illustration opposite page 2473.

**U'PAS,** one of the largest forest trees of the island of Java, a tree whose poisonous, milky juice has been the subject of various fables. It belongs to the nettle family. In 1844 specimens were transported to Europe, where several varieties are now grown in gardens and hothouses. The white-barked trunk, free of branches half or three-quarters of its height, is often more than a hundred feet tall. When the bark is bruised or cut a sticky, white fluid runs out, and with this the natives poison their arrowheads. It was formerly, but incorrectly, believed that the tree exhaled a substance which caused skin eruptions and was dangerous, if not fatal, to plants, men and beasts even at a distance of fifteen miles. The inner bark of the upas is used by natives for making bags and clothing.

**U'RAL MOUNTAINS** (in Russia pronounced *oo rahl' y'*), a mountain system extending along the eastern boundary of Russia from the Arctic Ocean to the vicinity of the Caspian Sea. These mountains are remarkable for their mineral wealth, for they contain rich deposits of platinum, the best in the world, and valuable mines of gold, copper, silver, mercury, nickel, cobalt and coal (see RUSSIA, subhead *Minerals and Mining*). Diamonds, sapphires, emeralds, amethysts and other precious stones also occur. The Urals are not a lofty system, as the average elevation is between 1,000 and 1,500 feet, but there are several peaks that rise over 5,000 feet above the sea. The highest, Mount Telpos, has an altitude of 5,433 feet. In the extreme northern part the mountains form a narrow, treeless ridge, but farther south they broaden out considerably, attaining a width of about 200 miles. Here the lower slopes are covered with dense forests. Through a pass in the central section the Trans-Siberian Railway makes its way into Siberia.

**URAL RIVER,** a river of Russia which rises on the eastern slopes of the Ural Mountains, and after a course of 1,485 miles enters the Caspian Sea through several mouths (see colored map, following page 2092). On its banks are the towns of Orsk, Orenburg, Uralsk and Guriev. Owing to the shallow water, its navigation is limited except during periods of high water. It has extensive salmon and sturgeon fisheries.

**URANIA,** *u ra' ni a,* the one of the nine Muses who was known as the patron of astronomy. In one hand she holds a globe and in the other a rod with which she traces out some figure. See MUSES.

**URANIUM,** *u ra' ni um,* a rare metallic element related chemically to chromium, molybdenum and tungsten. It is a heavy, white, moderately-hard metal, softer than steel, and having a specific gravity of 18.7. Uranium is never found native, but occurs in several ores, notably in pitchblende. The salts of uranium are used as pigments in glass and porcelain manufacture. Uranium received its name in honor of the discovery of the planet Uranus (1781) by Sir William Herschel. The metal possesses marked radioactivity. See RADIUM; RADIOACTIVITY.

**URANUS,** *u' ra nus,* one of the planets, seventh in distance from the sun, was discovered accidentally by Sir William Herschel in 1781. The astronomer at first thought it to be a comet, and it was not until a year later that it was clearly established as a planet. It is named after the mythological Uranus, lord of the heavens, husband of Gaea, the Earth. Uranus is visible to the naked eye and appears as a star of the sixth magnitude. It is about 180,000,000 miles distant from the sun, around which it revolves in eighty-four of our years. Peculiarities in the motion of Uranus led to the discovery of another planet, Neptune, in 1846.

The diameter of Uranus is believed to be about 32,000 miles, nearly four times that of the earth, but it is stated by some authorities as being only 28,500 miles. In bulk, Uranus is about sixty-six times greater than the earth; its mass is about fourteen and one-half times that of the earth, and its density about the same as that of the sun, or one-fourth the density of the earth. It is thought that Uranus rotates very rapidly on its axis, but no exact time can be stated, though the length of its day is probably between nine and ten hours. The light-reflecting power of Uranus is very great, probably a little greater than that of Jupiter. The gravity on the surface of Uranus, due to its great mass, is so much greater than on the earth that if a man could possibly go to Uranus he would be unable to lift hand or foot, and his life would be crushed out by his own weight.

**Satellites of Uranus.** Four attendant satellites accompany Uranus, namely, Ariel, Umbriel, Titania and Oberon. They are never visible to the naked eye, and can only be detected by the most powerful telescopes. The most peculiar thing about these satellites, apart from the fact that their orbits are nearly perpendicular to the orbit of the planet, is that in their orbits they move backward. Seen through a telescope, Uranus appears merely a pale, greenish disk, with no particular or distinctive markings, but the spectroscope indicates that Uranus is quite different from the other planets in composition. F.ST.A.

For comparative sizes of Uranus and the other planets and distances from the sun, see PLANET; for explanation of magnitude, see STAR, subhead *Magnitude*. See, also, ASTRONOMY.

**URANUS,** meaning *Heaven,* in Greek mythology, the most ancient of the gods, the personification of the sky. He was the husband of Gaea (Earth) and by her the father of the Cyclopes, the Titans, Lightning and Sheet Lightning, and the terrible hundred-handed giants. Uranus was deposed from his throne by Saturn, the youngest of the Titans, and killed; from his blood sprang the Furies.

**UR'BAN,** the name of eight Popes, of whom the most important were Urban II, Urban VI and Urban VIII.

**Urban II,** Pope from 1088 to 1099, found himself at his election forced to contend with Guibert of Ravenna, who, under the name of Clement III, claimed the Papal chair as the candidate of the Emperor Henry IV of France. Urban was successful, however, as he also was in defending the power of the Church from encroachments on the part of the Empire. At the Council of Clermont in 1095 he stoutly argued and preached the beginning of what was later the Crusades, and later helped in the organization of the movement, dying just at the time that Jerusalem fell into the hands of the Christians. He had attempted, but in vain, to bring about a union of the Greek and Latin Churches.

**Urban VI,** Pope from 1378 to 1389. His predecessor, Gregory XI, had brought back the Papal seat from Avignon to Rome, but the French cardinals were unwilling to agree to the transfer, and accordingly elected a candidate of their own, who was proclaimed Pope at Avignon as Clement VII, while Urban took his seat at Rome. The so-called Great Schism, or Western Schism, which resulted, endured for almost half a century.

**Urban VIII,** chosen Pope in 1623, reigned for twenty-one years. He had held important diplomatic posts previous to his election and had received the cardinal's hat in 1606. An enlightened, forceful ruler, he nevertheless laid himself liable to criticism by the preferments which he bestowed upon members of his own family. He upheld firmly the temporal powers of the Papacy, aspiring to wield such an influence in the affairs of various European countries as Gregory VII, for instance, had been able to achieve. Richelieu strongly opposed his policies, but in the end an agreement was entered into between the two, and in the Thirty Years' War the Pope supported France as against Spain and the Holy Roman Empire. He founded the College of the Propaganda.

For the first preacher of the Crusades, see PETER THE HERMIT. For a list of all Popes see the article POPE, in which will also be found the method of election to the Papal chair. Consult Pastor's *History of the Popes.*

**URBANA,** *ur ban'a,* ILL., the county seat of Champaign County, is noted as the home of the University of Illinois. It is a sister city of Champaign, two miles distant, and is situated northeast of the geographical center of the state, 128 miles southwest of Chicago and thirty-three miles east of Danville. Urbana is served by the Cleveland, Cincinnati, Chicago & Saint Louis (Big Four) and the Wabash railroads and by the Illinois Traction and the Kankakee & Urbana electric lines. The machine shops of the Big Four railroad give employment to many people. There are valuable deposits of clay in the vicinity, and bricks are extensively manufactured, about 300 people being employed in the brickyards. The most prominent buildings are those of the university (see ILLINOIS, UNIVERSITY OF). Other noteworthy buildings are a $90,000 Federal building, erected in 1914; a county courthouse, city hall, Y. M. C. A. building and public library. Urbana was settled in 1824, was chartered as a city in 1837 and rechartered in 1873. The population increased from 8,245 in 1910 to 9,889 in 1916 (Federal estimate). G.M.B.

**URINE,** *u'rin,* a fluid waste product of the body, separated from the blood by the kidneys. Blood is carried to these filtering organs through the *renal artery,* and the waste matter drawn from them is carried to the *bladder* through two small tubes called *ureters.* The fluid is expelled from the body through a canal called the *urethra,* which leads from the bladder.

In health the urine is a slightly-acid, amber-colored liquid, somewhat heavier than water; its average specific gravity is 1.022. It is made up of water, urea (a solid), and various inorganic salts. Important among these salts are sodium, potassium, ammonia, calcium and magnesium. These ingredients occur in a given quantity of normal urine in the following proportion: water, three pints; urea, one and one-seventh ounces; salts, three-fourths ounce. The amount of urine expelled from the kidneys each twenty-four hours varies considerably, but from two and one-half to four pints may be considered an average amount. The quantity is lessened, for instance, when the body perspires freely, and increased when one drinks large amounts of water.

The condition of the urine is an index to the state of one's health. Sugar in the fluid is an indication of diabetes, and albumin of Bright's disease, and the excretion is tested by physicians in their diagnosis of other ailments. In general it should be said that irregularities in the functioning of the kidneys or peculiarities in appearance of urine should be reported to the family doctor. See KIDNEYS. C.B.B.

**UR'SA MA'JOR,** a Latin phrase meaning *greater bear,* is the scientific name for the conspicuous northern constellation commonly known as the Great Bear or the Great Dipper. *Ursa Minor (lesser bear)* is the name given by astronomers to the Little Bear, or Little Dipper, a neighboring constellation. For description and map see BEAR, GREAT.

**UR'SO,** CAMILLA (1842-1902), a violinist, was born at Nantes, France, of Italian parents. She began the study of the violin at the age of six, and within one year had made such marvelous progress that she gave public concerts. Her father, who was an organist at Nantes, was so impressed by this display of genius that he resigned his position and removed to Paris, where the child might have better training. She studied in the Conservatory of Paris and at the age of nine made a concert tour of France. When she was ten years old she emigrated with the family to the United States, and during the next three years Camilla made an extraordinary impression on American musicians. From her thirteenth to her eighteenth year she gave up all public work for further study, but in 1862 began a long series of tours of America, Europe, Australia and South Africa. She was a child of genius, for her teachers always found that she had grasped the technique of violin playing before they could explain it.

**URSULA,** *ur'su la,* SAINT. According to a medieval legend of the Roman Catholic Church, Ursula was a virgin from Britain who, with eleven companions, was martyred by the Huns at Cologne, while the maidens were returning from a pious pilgrimage to Rome. By a probable error in the translation of an old inscription in Cologne, the number of the maidens of the legend was later multiplied by one thousand, and the martyrdom of Saint Ursula and the eleven thousand virgins is now celebrated by the Church, the day being October 21.

The martyrdom of Ursula is supposed to have taken place in 237, but no reference to the legend appears in any of the religious writings until the ninth century. From that time on it is referred to more and more frequently. In the twelfth century, where an old Roman burying ground was uncovered in Cologne, it was declared that the bones found therein were those of murdered virgins, and interest and excitement were widespread.

There has been among the Church scholars much discussion of this legend. The radicals are inclined to believe it a mere retelling, in Christian terms, of a pagan myth, but the more conservative writers hold that it is based on an actual occurrence.

**UR'SULINES,** or **NUNS OF SAINT URSULA,** a Roman Catholic sisterhood, established at Brescia, Italy, in 1535, by Angela Merici. The members entered the community for the purpose of caring for the sick, instructing the young and receiving training in holy living. The sisterhood was not at first strict in discipline, but later became a formal Order, requiring the three vows. In 1574 the Ursuline nuns entered France, and in 1611 a large convent was built for them near Paris. The Order grew rapidly and spread to most European countries and to America, convents being established in Quebec in 1639 and in New Orleans in 1727. The convents in France were destroyed at the time of the Revolution, restored by Napoleon in 1808, and again suppressed by the anticlerical laws of 1904. The total number of Ursuline sisters in all countries is at present about 4,500.

**URTICARIA,** *ur ti ka'ri a,* from the Latin word for *nettle,* is the scientific name for hives or nettle rash. The term is used because the affection is often caused by the irritating poison of the stinging nettle, but this is by no means the only cause of the disorder. For a fuller description, see HIVES.

**URUGUAY,** *u'roogwa,* or *oo'roogwi,* the smallest republic of South America, and one of the most progressive. It is officially known as the EASTERN REPUBLIC OF URUGUAY, and takes its name from the great river which borders it on the west. The length and breadth of the roughly-oval country are approximately equal—350 miles—and the area is 72,168 square miles—slightly less than the combined areas of the New England states and New Jersey. The population on December 31, 1916, was estimated to be 1,340,000.

**Physical Features.** Uruguay's situation, in the south temperate zone, with an ocean border, gives it a mild, moist and delightful climate. The temperature ranges from 35° to 86°. Its coast cities, Maldonado and Montevideo, are passed by ocean vessels bound for Buenos Aires, and are nearly due east of La Plata, in Argentina. Lakes Merim, Castillos and Rocha lie near the coast in the southeast. The Uruguay River, forming the western boundary, unites with the Parana to form the great Rio de la Plata. The coast is low and sandy. In the western part the country is gently rolling, and in the north and east the land rises to form a spur of the coast range of Brazil. There are no large forests, though timber grows in the valleys where there is running water, and includes valuable hard woods. For the most part the land is prairie.

**The People and Their Cities.** The people may be classified as white, Guarani, and mixed, the two latter classes coming under the designation "colored," which has no reference to negroes or to negro mixtures, since the country has never had any negro population. The Guarani are the same as the Indians of Paraguay. The aborigines are described by historians as strangely yellow, with no trace of red. These men were beardless, and the people were peculiarly silent and secretive. The white and colored elements have long been quite evenly balanced. The foreign-born population is overwhelmingly Spanish and Italian, though there are many Germans and French. The purely Spanish element, long dominant, has impressed the speech and manners of Spain upon the white and mixed population. The color line was drawn in politics long ago, but the names of the political parties, the Whites and the Colored (*Blancos* and *Colorados*) have lost much of their original significance.

The whites of pure blood, with their immigration and natural increase, will steadily gain upon the aboriginal and mixed elements. Of the 6,073 men who married in Uruguay in 1914, nearly one-fifth were Spaniards, Italians, Argentinos, and Brazilians, the Spaniards and Italians alone constituting nearly one-sixth of the whole number.

The census taken at the opening of the twentieth century showed the discouraging fact that half the population of the country was illiterate, and that more than a quarter of the births in that year were illegitimate. Education means much to the man or woman of European ancestry, but is less appreciated by the servile class of the native race, who, as shepherds, herders, or ranchers, find less occasion to read, though they may be keen observers and skilled in many manual arts.

LOCATION MAP
Showing Uruguay's position in the continent and its size in comparison with the other South American republics.

First among the cities is Montevideo, the capital, which is beautifully situated on a central point of the sea coast, and possesses attractions as a resort. It had a population of 378,466 in January, 1916. Paysandú, on the western boundary

and on the Uruguay River, is next, with 22,000. Mercedes, on the Rio Nyro, has 18,000; San José, on the railway northwest of the capital, and Melo, in the eastern part, have each 13,000. Rocha, in the southeast, has 12,000; Agosto, 7,000; and Maldonado, 6,000. There are 108 towns and villages shown on maps, in addition to these cities. In the cities and towns Uruguayan life is seen at its best.

**Public Utilities.** The government of Uruguay began to build and operate railways by constructing a belt road around the harbor at Montevideo, and followed this up recently by taking over for operation the new railway from Durazno to Trinidad. A law in 1916 authorized the executive department of the government to take control of telegraph, telephone and mail service; this will be done, in time, on a comprehensive and systematic plan, with departmental offices in all the eighteen departments (provinces) of the nation. Excellent civil-service rules have been adopted. The American International Corporation (capitalized at $50,000,000) has undertaken to finance a new and extensive water supply system and other public works in Uruguay.

COMPARATIVE AREAS
Uruguay is but little larger than the state of Missouri.

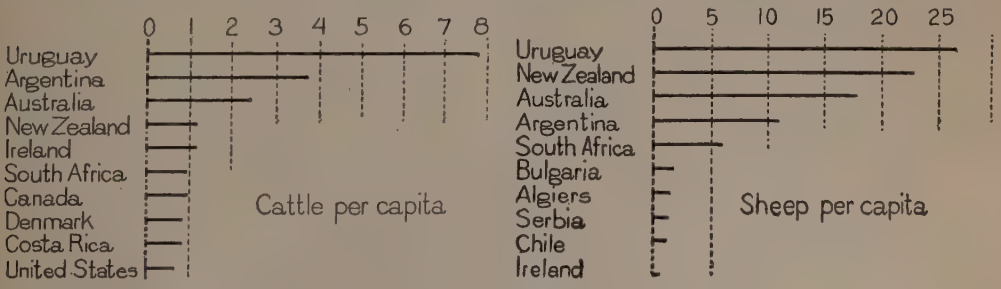
The national commission of agricultural promotion, recently organized, distributes seeds and supplies demonstrators for the improvement of agriculture.

**Production and Commerce.** Thirty-three times as much land is devoted to stock raising as to cultivation. It is estimated that there are on the ranges and ranches at least 8,000,000 head of cattle. There are also about 26,000,000 sheep, which produce generally a coarse wool. It will be seen that there is employment for an army of herders and shepherds. There is a steady market for Uruguayan wool, hides, meat, meat products and live stock. Of the field crops wheat, flaxseed, oats, barley and tobacco are important. The vine and the olive have been imported from Italy, and are cultivated on many plantations.

While there are no extensive forests there is much hardwood timber, suitable for use in various manufactures. Gold was discovered in 1842, and gold mining has possessed some importance among the nation's industries ever since. Uruguay depends wholly upon importation for a great number of its manufactured articles, and there are few factories in the country, though meat packing and distilling are of considerable importance.

The foreign commerce of Uruguay for 1915 amounted to 108,071,000 pesos (a peso is equivalent to $1.034 in U. S. money). Of this foreign commerce, 34,780,000 pesos represented the imports and 73,291,000 the exports. The bulk of the exports consisted of animal and vegetable products. In 1912 there were 3,300 miles of railway completed, with much more projected.

**Greek Antiquities.** Uruguay is the only American land possessing incontestable proof of its discovery by Europeans in ancient days. Not far from Montevideo, in 1827, a farmer of influence came upon a buried tablet of stone, covering a small vault of masonry and bearing an inscription in Greek letters, a part of which read as follows: "In the reign of Alexander, the son of Philip, King of Macedon, in the 63rd Olympiad, Ptolemy." The rest of the inscription was so obscure that it could not be deciphered. Moreover, the letters indicating the date were misread, and the translation should




CATTLE AND SHEEP IN URUGUAY
There are more cattle and sheep in this little republic, per capita, than in any other country in the world.

## *Outline and Questions on Uruguay*

### I. Location

(1) Boundaries—Brazil, Paraguay, Argentina, Atlantic Ocean
(2) Latitude, 30° to 35° south
(3) Longitude, 53° 25′ west
(4) Area
  (a) Actual, 72,168 square miles
  (b) Comparative

### II. The Land

(1) Surface features
  (a) Low, sandy coast
  (b) Rolling or hilly inland region
(2) Rivers and lakes
(3) Prairies
(4) Climate

### III. The People

(1) Classification
  (a) Whites
  (b) Guarani, or Indians
  (c) Mixed
(2) Population
(3) Education
(4) Cities

### IV. Industries and Commerce

(1) Agriculture
  (a) Chief crops
(2) Predominance of stock raising
(3) Mining
(4) Minor importance of manufactures
(5) Commerce
  (a) Preponderance of exports over imports
(6) Transportation

### V. Government and History

(1) Centralized republican form
  (a) Departments
(2) Early Spanish possession
(3) Became separate dependency
(4) Independence secured
(5) Internal and external troubles
(6) Recent progress

## *Questions*

What does the name of the capital of Uruguay mean?

How did the aborigines of this country differ from most of the other "Indians" of America?

In a well-mixed crowd of Uruguayans how many out of a hundred would be found who could read and write?

When did the country become independent? Was this earlier or later than the countries upon which it borders?

What seven states of the American Union could be made of this republic?

How many independent countries of South America are smaller? Which compares most closely with it in size?

What connection is there between ancient Greece and this New World country? How has the connection been established?

What educational institution shows that the capital is a progressive and up-to-date city?

Where was gold discovered first, in Uruguay or in California?

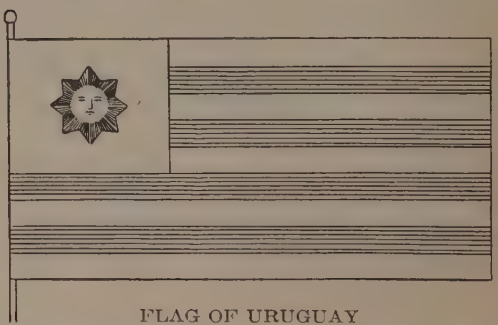
What does the government do to help the farmer?

have been "in the 113th Olympiad" (between 324 and 320 B. C.). Within the little vault were found a sword, on the handle of which appeared the model of a head, presumably that of Philip's son, Alexander the Great (whose profile is familiar in histories); another sword; a helmet embossed with medallion figures representing Achilles dragging the body of Hector around the walls of Troy (as related in Homer's *Iliad*); a shield; a large earthen vessel, which might or might not be of Greek design. Rust had invaded the metal deeply, and the weathering of the stone had rendered the inscription difficult to read even in its initial words, which were by far the best preserved.

The inscription, coming to light after twenty centuries, seems to tell of one of the old Greek sea captains of Alexander's day, some of whom are otherwise known to have entered the Atlantic; and we may infer that his ship was blown across the ocean, and never returned to Greece.

**Government and Education.** Uruguay is a centralized state with a government much like that of the American Union. The president is elected for four years. The Congress consists of two houses, the members of which are elected by the people.

Primary education is supplied by public schools, and is both free and compulsory, but there is much disregard of this in certain districts. There are many church schools and pre-



FLAG OF URUGUAY

Shaded lines are dark blue; the star is gold; plain surface, white.

paratory academies for the children of people of wealth. A state university is maintained at Montevideo; a night school for women, with a special view to domestic education, is another educational institution of this progressive capital.

**History.** Uruguay was visited by the Spaniards under Juan de Solis in 1512, and fourteen years later the Spanish took possession at Montevideo under Zavala, the governor at

Buenos Aires. After 1750 Uruguay was a separate dependency of the Spanish crown, with Montevideo as its capital. This city was captured by the British in 1870, but their occupation did not last long.

The independence of Uruguay was declared in 1826. Two years later the young republic refused to join any of its neighbors when federation was urged by them, and in 1830, with its own constitution developed and formally promulgated, it entered upon its career of self-government. Its history, however, like that of most of the Spanish-American republics, was long a record of internal contention, many striving for power by unscrupulous means. Besieged by the Argentines, Uruguay fought for its existence from 1843 to 1852. For five years before the overthrow of the dictator Lopez of Paraguay, in 1870, Uruguay was forced to resist his aggressions.

A better period seems to have arrived for the domestic affairs of the state, and there is little likelihood that the disorders of the past will recur, owing to improved conditions and the progressive character of the administrations.

In October, 1917, Uruguay severed diplomatic relations with Germany, not because it had received any direct offense, but because it desired to be enrolled with the defenders of democracy and justice. H.M.S.

Consult Martin's *Through Five Republics;* Vincent's *Round and about South America.*

**URUGUAY RIVER,** a river of South America, important because of its navigation facilities, its fisheries and its rich, fertile basin, which produces an abundance of timber. Its source is in the province of Santa Catharina, in Southern Brazil. It follows a westerly, then a southerly direction, forming the partial boundary of Brazil and Argentina and completely separating Uruguay from Argentina, and discharges into the estuary of the La Plata River. Navigation is practicable for large vessels as far as Paysandú, and for smaller vessels to Salto, where the rapids of Salto Grande occur. In periods of high flood, steamers pass over the obstructions and resume navigation for 300 miles. In the lower course the river becomes a lake, varying from four to seven miles in width. The entire length of the river is about 1,000 miles.

**USURY,** *u'zhu ri,* in present usage, interest in excess of the legal rate. The principles involved in the taking of interest were not well understood until recent times; consequently, it is common to find *usury* and *interest* used in the same sense by early writers. In Biblical times a money lender was a usurer, and in Old English usage no distinction was made between the taking of interest and the exacting of usury. This confusion of ideas continued until the rise of the modern industrial and commercial systems familiarized men with the practice of borrowing money, not to relieve desperate need but for the purposes of investment. The reasonable sum demanded for the use of such money came to be known as interest.

Laws have been passed by most states of the Union and by the Canadian provinces to safeguard the borrower, and penalties have been imposed for the exaction of exorbitant rates of interest. They are called usury laws. In a few instances no penalty attaches to usury, but the penalty nearly always ranges from fine and imprisonment to forfeiture of principal and interest. For the legal rates of interest in the United States and Canada, see INTEREST, page 3012. See, also, MONEY.

**UTAH,** popularly known as the SALT LAKE STATE, is one of the Rocky Mountains group of the United States. It was named for the Ute, or Utah, tribe of Indians, the name meaning *highlanders.* The Mormon founders called the state DESERET, a term which was used in the Book of Mormon to signify *industry.* They adopted this word as the state motto, the beehive as the symbol, and the sego lily, whose roots nourished them during the early years of famine, as the state flower. It has been through their energy and thrift that the state

has been converted from a wilderness of rugged mountains and barren valleys to an important agricultural and industrial commonwealth.

**Size and Location.** The state occupies a rectangular area of 84,990 square miles, between the main ranges of the Rocky Mountains and the Sierra Nevadas. The northeast corner of the rectangle is cut off by Wyoming; the remainder of the eastern boundary is formed by Colorado, and the western boundary by Nevada, with Idaho and Arizona lying to the north and south. It ranks tenth in size among the states, and is about four times the area of Nova Scotia.

**The People.** The story of the people of Utah is largely a history of the Mormons who entered the state in 1847 (see MORMONS). Although the number of inhabitants has steadily increased since the state's admission to the Union, in January, 1896, it ranked in 1910 only forty-first in population among the states. The people numbered 373,351 in 1910, averaging 4.5 per square mile. Of the total, 3,123 were Indians, 1,144 were negroes and 17.6 per cent were of foreign birth, chiefly English, Danish, Swedish, Greek, German, Italian, Scotch and Norwegian. The population on January 1, 1917, was estimated by Federal authorities as 438,974.

About one-half of the total number of inhabitants live in incorporated towns or cities of over 2,500 people. The chief cities are Salt Lake City, the capital, which has a population of over 110,000; Ogden, with over 30,000; Provo and Logan. Each is described in these volumes under its title. Over three-fourths of the inhabitants are members of the Mormon Church, or Church of Latter-Day Saints. Other prominent religious bodies are the Roman Catholics, Methodists and Presbyterians.

**Education.** Liberal provision is made for free education; textbooks are furnished free and vocational training has been introduced. Almost four-fifths of the total school population is enrolled in schools, and the average illiteracy in 1910 was but 2.5 per cent.

The public school system was organized in 1890, and is administered by the state superintendent of public instruction and the state board of education. The board also controls the establishment and supervision of state libraries and gymnasiums. Four sections of public land in each county have been reserved by the government for school purposes, and the educational system is also supported by local taxation and appropriations by the legislature. Besides the kindergartens and grade and high schools, the state maintains a university at Salt Lake City, which includes a preparatory school, a normal school and college of mines; a branch normal school at Cedar City, and an agricultural college at Logan.

The Latter-Day Saints have a private educational system, their leading institutions being the Latter-Day Saints' University at Salt Lake City; Brigham Young University at Provo; Brigham Young College at Ogden, with a branch at Beaver City. Other prominent denominational institutions are Sheldon Jackson or Westminster College (Presbyterian) and All Hallows College (Roman Catholic), both at Salt Lake City.

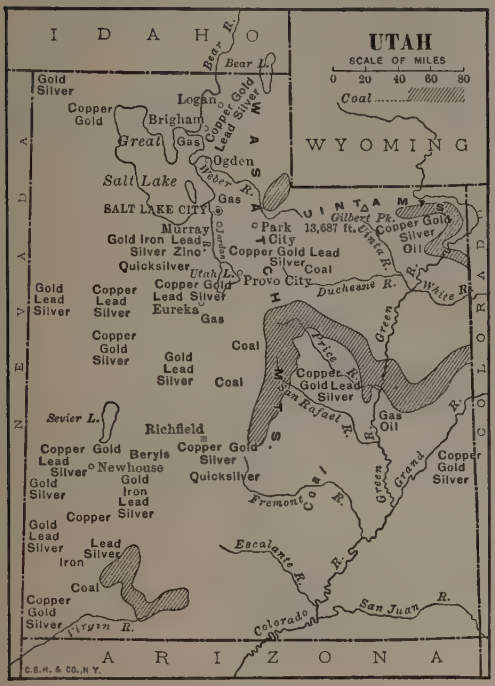
**Charity and Correction.** Utah is one of the states which has not established general state control of public institutions; these are controlled by separate boards appointed by the governor. There is an industrial school at Ogden, a hospital for the insane at Provo, a school for the deaf and blind at Ogden, and a state prison at Salt Lake City.

## *The Land and Its Resources*

**The Land.** Utah is a great plateau covered with sagebrush and broken into lofty mountain ranges, with towering peaks, beetling cliffs and deep canyons. The two chief ranges are the Uinta Mountains, forming a great barrier along the eastern half of the northern boundary, and the Wasatch Mountains, crossing the center of the state from north to south. Among the domelike summits of the Uintas, Gilbert, Emmons and Wilson peaks rise more than 13,000 feet above the sea.

East of the rugged Wasatch Range, which in the south broadens out into the Wasatch and Aquarius plateaus, lies an elevated plain roughened by detached mountain ranges. West of this backbone of mountains lies the Great Basin, a region of arid valleys separated by steep, islandlike mountains. At the foot of the snow-covered peaks the valleys are fertile, but a region of about 4,000 square miles west of Great Salt Lake is barren, and is known as the *Great American Desert*. Thus Utah presents a panorama of magnificent scenery—great canyons with deep, narrow mouths, torrents and cascades dashing over gorgeous colored rocks; hill slopes covered with brilliant flowers, and

beyond, the gray desert and the dull, clay mesas grotesquely molded by wind and rain. Foremost among the points of scenic interest are the natural bridges of San Juan County. The Nonnezoshi Bridge is the highest natural




OUTLINE MAP OF UTAH

Showing boundaries, rivers, chief cities, locations of coal measures and metals, and the highest point of land in the state.

bridge in the world, and others are high enough to span the dome of the national Capitol building in Washington. Other objects of interest are the great organ rock, resembling a huge pipe organ, 490 feet high and 350 feet wide, which rises from the plain southwest of Bluff; the Colorado River Canyon, and Bridal Veil Falls in Provo Canyon.

**Rivers and Lakes.** The principal river in Utah is the Colorado, which is formed by the union of the Green and Grand rivers, in the eastern part of the state. The Green and the Colorado are fed by many rivers rising in the Uinta and Wasatch mountains, including the Duchesne, the White, the Price, the San Rafael and the Virgin. The San Juan, entering the southeastern corner of the state from Colorado, is the largest tributary from the east. The extreme northwest corner is drained by small affluents of the Snake River in Idaho, and the remaining area of the western half of the state is included in the Great Basin region, the largest area of interior drainage in the United States. The chief river of this section is the Sevier, which rises in the Wasatch Mountains, cuts a deep canyon through their western ridges and flows down into Sevier Lake. The Provo, Weber and the Bear rivers rise in the western end of the Uinta range and flow into Utah Lake. Many of the small streams, fed by mountain torrents, evaporate or are absorbed in the salty soil when they reach the plain.

Great Salt Lake and the smaller lakes of the region are the remnants of a fresh-water lake which at one time covered a great basin of 19,760 square miles. The shore lines of this lake of olden times may be seen on the hillsides.

**Climate.** Lying between the high ranges of the Sierra Nevada and the Rocky Mountains, Utah is cut off from the moisture-bearing winds, and the climate is exceedingly dry. The summer temperature ranges from almost tropical heat in the southwest to cool temperatures in the high mountains, where it freezes nearly every night of the year. The winters are severe in the northern part of the state, though mild in the south. The lofty elevation and lack of humidity make the climate invigorating and healthful. The rainfall is slight, the annual average being sixteen inches; the greater part of it occurs during the winter and in the higher ranges, where the peaks are covered with eternal snow.

**Irrigation and Agriculture.** The climate is favorable for agriculture, and except in the Great Desert crops grow luxuriantly wherever water can be obtained. Irrigation has been of greatest importance in the development of the state—it has been its salvation. It was introduced by the Mormons, who were the pioneers in the practice of irrigation in the West. The land was divided into small farms of uniform size, and the irrigating systems were controlled by Mormon authorities, who impartially and economically distributed the water. With the opening of the unimproved areas for dry farming (which see), the farms, which originally averaged smaller than in any other state, have increased in size. The available supply of water has recently been increased by the building of reservoirs. The total area of irrigated land exceeds 1,000,000 acres, or about five-sixths of all the improved land.

Although only a small proportion of the total land area has been improved, agriculture has always been the chief occupation, and it is a steadily growing industry. The principal farm-

ing sections are in Salt Lake Valley and the rich Cache Valley in the north-central part of the state. Hay, wheat, oats and potatoes are raised extensively. Quantities of sugar beets are grown on the irrigated land, and the state ranks fourth in the Union in the annual production of this crop. Barley, rye, corn and vegetables are successfully grown, and excellent fruit is raised, the annual production of apples exceeding 800,000 bushels. In the southern counties semitropical fruits such as figs, lemons and almonds may be grown, and the cultivation of raisin grapes is becoming important.

Several experiment stations have been established in arid districts, to demonstrate what crops may be grown without irrigation, and much of the hay and wheat is now grown on "dry farms." Live stock, especially sheep and cattle, is raised extensively in the eastern plateau, but dairying is confined to the fertile, irrigated valleys.

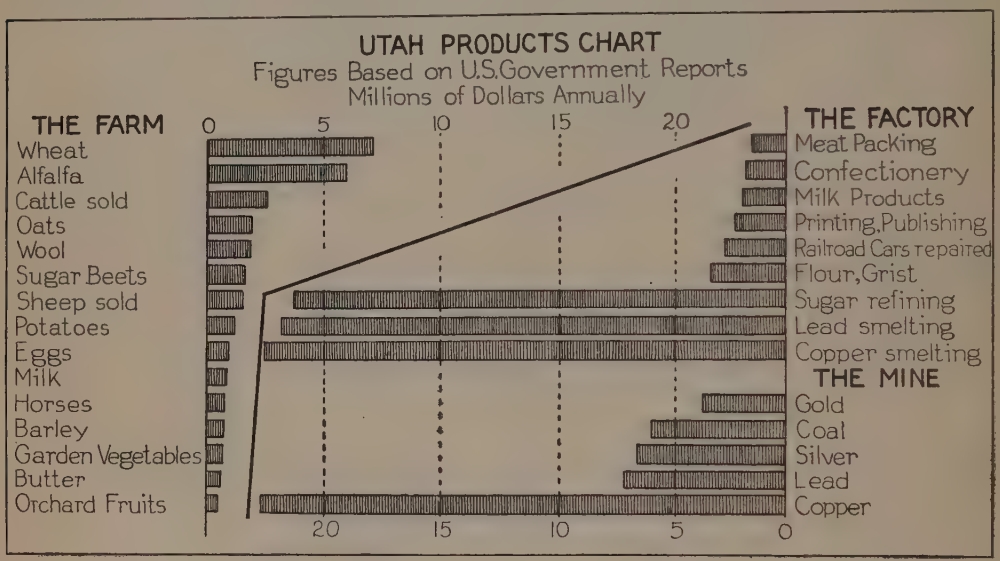
**Forests.** The national forests cover about 7,449,000 acres, and they contain a large part of the woodland area of the state. The most densely forested sections are in the Uinta Mountains, on the Aquarius Plateau and along the Sevier River. The output of timber is not sufficient to meet the state's needs, but a more adequate supply in the future is insured by the protection of underbrush and restriction of cutting.

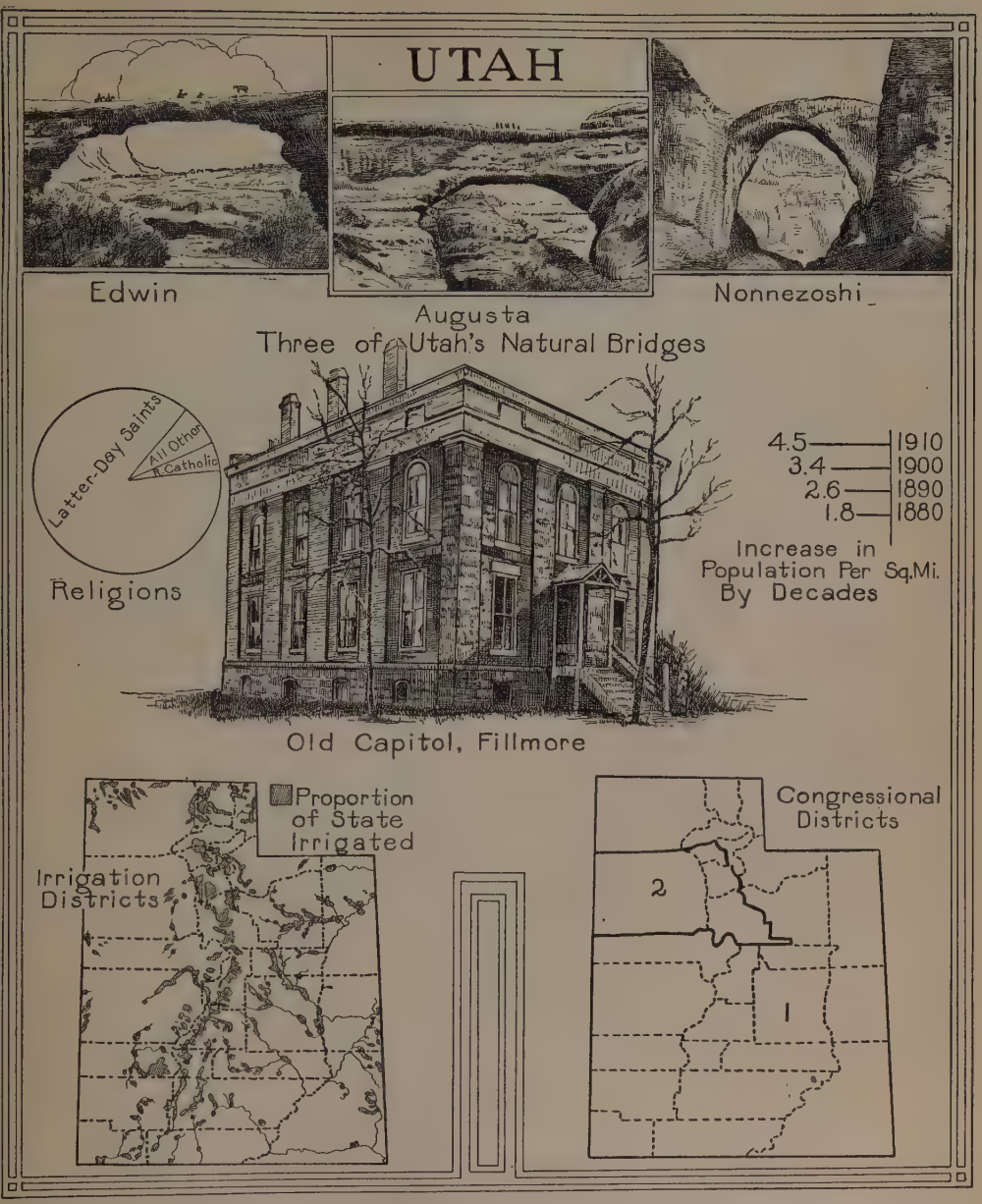
**Mining.** Utah's minerals are its richest possession. In the early development of the state mining was discouraged by the Mormon leader, Brigham Young, who said "we cannot eat gold and silver," and he directed the energies of his people toward agriculture. After his death in 1877 the development of the mining industry began, and Utah is now a mining state of importance.

Extensive deposits of coal exist in the eastern slopes of the Wasatch Mountains, particularly in Carbon County, and a field covers more than 2,000 square miles in the southern part of the state. The mining of coal and manufacture of coke has rapidly increased, and the annual output of coal now exceeds 3,000,000 tons.

Copper and lead are the chief metal products. In lead production in the United States Utah ranks third, and in the total copper output the state holds fourth place. In 1914, however, Utah's yield of copper surpassed that of Michigan, and in the country's output for that one year the state followed Arizona and Montana. High-grade iron ores and zinc are produced, and silver and gold are obtained from the copper and lead ores. The output of gold decreased with the decline in the production of the Mercer mines in Tooele County, but the yield of silver increased in 1915; and owing to the small production in Idaho, the leading silver state, Montana and Utah in that year rose from second and third place, respectively, to first and second rank among the silver-producing states.

The deposits of alunite, a pink crystal rock, near Marysvale, are the only ones of commercial importance in the United States, and the only mine producing bismuth in the Union in 1915 was that in the Deep Creek Mountains.






The state also contains important rock salt districts in the Sevier Valley and near Redmond, where the salt occurs near the surface in open pits or cuts. Sea salt is taken from Great Salt Lake, and Utah ranks ninth among the salt-producing states in the Union. In the production of natural asphalt used in the manufacture of varnishes, japans and rubber substitutes, Utah is surpassed only by California. Other mineral products are zinc, borax, sulphur, pumice, gypsum, granite, marble, slate, limestone, sandstone, clay, mineral waters and a newly discovered radium-bearing mineral called uvanite.

**Manufactures.** The abundant supply of coal and the power furnished by the swift streams of the western slopes of the Wasatch Range have contributed to the rapid development of manufactures. The leading industry is the smelting and refining of copper and lead ores, the state ranking second in the Union in the amount of concentrated copper produced and in

the quantity treated. The milling of flour, the manufacture of beet sugar, in which Utah ranks fourth among the states, and railroad repairing, founding, dairying and canning are also large industries. The woolen mills established in 1872 at Provo by Brigham Young are the oldest and among the largest west of the Mississippi River. Utah is fortieth among the states in value of manufactures.

**Transportation.** The state has over 2,350 miles of railroad, the chief lines being the Denver & Rio Grande, the San Pedro, Los Angeles & Salt Lake, the Central Pacific, the Oregon Short Line, the Western Pacific and the Union Pacific. There are no navigable rivers, but the proportion of improved public roads is greater than in any other state west of the Mississippi.

## *Government and History*

**Government.** The present state constitution was adopted in 1895. By an amendment adopted in 1896 women have equal rights with men to vote and to hold office.

The *executive department* consists of the governor, secretary of state, auditor, treasurer, attorney-general and superintendent of public instruction, all of whom are elected for four years. The pardoning power does not rest with the governor, but with a board consisting of the governor, a justice of the supreme court and the attorney-general.

The *legislative body* is the senate and house of representatives. Senators are elected for four years, and are not to exceed thirty in number. Representatives are elected for two years, and their number must be at least twice and not more than three times the number of senators.

The *judiciary* consists of the supreme court and such inferior courts as are established by law. The supreme court judges are elected for terms of six years and may be from three to five in number.

There is a uniform system of county government, and the organization of cities, precincts and towns is established by general laws. Initiative and referendum laws are in force, but they do not apply to constitutional amendments.

**History.** Under the Spanish explorer Cardenas, an expedition sent by Coronado in 1540 penetrated the region which is now Utah, as far as the Colorado River. More than two centuries later two Franciscan friars reached Utah Lake, in an effort to find a direct route to the Pacific. Trappers and immigrants crossed the region in the early part of the nineteenth century, but the Indians were practically the only inhabitants until 1847, when the Mormons made it their refuge.

In the following year the territory including the present state, which had belonged to Mexico, was ceded to the United States by the treaty of Guadalupe Hidalgo (see illustration, page 3764). The Mormons organized a government and asked admission to the Union as the state of Deseret. Congress refused to recognize the state, and in 1850 organized it as the territory of Utah, including an area much greater than the state now has. Brigham Young was made its first governor. An attempt of the Mormons to exclude Gentile settlers resulted in the sending of United States troops to the territory in 1858. The extension of the Union Pacific Railroad across the southern part of the territory in 1869 gave Utah access to the markets of the Mississippi Valley and the Pacific coast, and since that date its industrial growth has been steady and rapid.

A law was passed by Congress in 1862 prohibiting polygamy, which was practiced by the Mormons, but the custom continued until 1887, when a stringent law was passed disfranchising polygamists and confiscating the property of the Church of the Latter-Day Saints. In 1890, the Mormon president issued a manifesto abolishing the practice. Four years later the territory drew up a constitution, and in 1896 it was admitted as a state.

Important industrial and labor laws have been passed. Serious strikes occurred in 1914 at the Bingham copper mines, and the following year an uprising of the Indians on the Piute Reservation was averted only through the services of General Hugh Scott, whom the government had sent to adjust matters. In 1917, a bill establishing statewide prohibition, became effective.

**Other Items of Interest.** Great Salt Lake is the largest body of salt water in the United States.

Four barrels of the water of this lake will yield, after evaporation, almost a barrel of salt.

In Utah, just north of the old Mormon road to California, is an almost inaccessible valley which is a sea of white, glaring sand. No beast

## *Research Questions on Utah*

**(An Outline suitable for Utah will be found with the article "State.")**

What does the word *Deseret* mean, and what part has it played in the history of Utah?

Where is there a natural pulpit, and when did it figure in history?

What people made Utah what it is? Trace their history up to the time they arrived in the territory.

Describe the most important building which these people have erected in the capital city.

What connection is there between the motto of the state of Utah and its symbol?

What is the state flower and why was it chosen?

How many states are larger than Utah? How many of these larger states have a larger population?

How many states have a larger population? (See table in article UNITED STATES.)

In how many states are there fewer inhabitants to the square mile?

If the entire country had the same density of population as has Utah, how many inhabitants would it have?

What per cent of the inhabitants are Indians? How does the state compare in this respect with New Mexico? With Oklahoma? With South Dakota?

What and where is the Great American Desert?

What is a mesa? What does the name mean, and why is it applied?

What is the highest natural bridge in the world? How high is it? (See NATURAL BRIDGE.)

What and where is the great organ rock? What are its dimensions?

What is Utah's chief river noted for after it leaves the state?

Where was there once a lake almost as large as Lake Michigan which no longer exists?

What and where is the largest salt-water lake in the United States? Since all the rivers that empty into it bear fresh water, how do you account for its saltness?

If you wanted to obtain four barrels of salt from the waters of this lake, how much water would you need?

Why is there so little rainfall in the state of Utah?

What is "dry farming," and how has it changed agricultural conditions in this state?

What part of the cultivated land is irrigated? Who first introduced irrigation into this region?

Where is the Valley of Death, and why is it so called?

Who said "we cannot eat gold and silver," and what was his reason for the statement?

When was the state second in silver production, and why?

What resources has the state which make possible a prosperous industrial future?

What distinction has Utah in regard to its improved roads?

What attitude has the state taken on the question of woman suffrage? On the liquor question?

lives within it; no bird ever flies over it. This depression is called the Valley of Death, because, in 1850, a train of immigrants, eighty-seven families in all, perished in an attempt to cross it. Many years later the wagons were found, surrounded by the skeletons of people and of animals, half buried in the sand.

In Echo Canyon in Utah is a famous rock which closely resembles in shape a pulpit. Here, it is supposed, Brigham Young preached his first sermon within the chosen territory to his Mormon followers when they entered Utah in 1847.

An excellent beach on Great Salt Lake is Garfield Beach. Here the sand grains are peculiarly rounded, instead of being sharp-cornered like ordinary sand, and as a result the sand has an especially grateful, soft feeling to the bare feet.

Utah has adopted the indeterminate sentence for persons convicted of crime. That is, a criminal is sentenced to prison not for a certain specified term of years, but for an indefinite period, until he seems fit to mingle again with his fellow men. E.B.P.

Consult Whitney's *Making of a State;* Cannon's *Under the Prophet in Utah.*

**Related Subjects.** The reader may consult the following articles in these volumes for information that will be of interest in connection with this discussion of Utah:

CITIES

| | |
|---|---|
| Logan | Provo |
| Ogden | Salt Lake City |

LEADING PRODUCTS

| | |
|---|---|
| Asphalt | Coffee |
| Beet, subhead *Sugar Beets* | Lead |
| Bismuth | Salt |
| Coal | Silver |

PHYSICAL FEATURES

| | |
|---|---|
| Colorado River | Uinta Mountains |
| Great Salt Lake | Utah Lake |

UNCLASSIFIED

| | |
|---|---|
| Dry Farming | Polygamy |
| Irrigation | Young, Brigham |
| Mormons | |

**UTAH,** UNIVERSITY OF, a state institution located at Salt Lake City, first organized in 1850 as the University of the State of Deseret. For a number of years its continued existence was uncertain, for it was far from a railroad, and funds and students were lacking, but later it entered upon a period of successful development. The power to confer degrees was granted by the legislature in 1884, and the name was changed to the University of Utah in 1892. Two years later the institution received

from Congress a grant of sixty acres, subsequently increased to ninety-two, on the Fort Douglas Military Reservation, immediately east of the city. The state legislature has since given over $800,000 for building purposes and has arranged for an income by a state tax. The university is organized into schools of arts and sciences, education, mines, medicine and law. The summer school is even more largely attended than the regular winter session. The faculty numbers about 110, and the student enrolment is over 1,600. There is a library of 45,000 volumes.

**UTAH LAKE,** the largest fresh-water lake in the state of Utah, lying in a valley between mountain ranges, thirty miles southwest of Great Salt Lake. Its greatest length is about twenty-five miles; it is from three to twelve miles wide, and covers an area of about 150 square miles, at an altitude of 4,505 feet above sea level. Mountains surround it on all sides, and it receives its water from streams descending the slopes of the Wasatch range. The outlet is by the River Jordan into Great Salt Lake.

**UTE,** a branch of the Shoshonean family of North American Indians, who at one time occupied the central and western parts of Colorado, the northeastern section of Utah and a portion of New Mexico. In 1879 government agents endeavored to persuade the Utes to turn their attention to agriculture; they were supplied with the necessary implements, as it was realized that the vast regions used by the Indians for hunting could not be permanently left open to them. A spirit of mutiny arose among them, and the local Indian agent wrote to the Bureau of Indian Affairs for assistance. A body of soldiers under Major Thornburgh was sent to the White River agency in September, but the advancing cavalry was attacked near Milk River, and the major and thirteen of his men were killed. On the same day the Indians killed Meeker, the agent, and his men. Another force under General Merritt arrived at the agency later, and Ouray, the chief of the White River Utes, made such promises for the good behavior of his tribe that no attempt was made to punish the murderers.

The Utes have since sold most of their lands to the United States government, and now live on a large reservation in Southwestern Colorado. They number about 2,000.

**U'TICA,** an ancient North African city, which, tradition says, was built by the Phoenicians in 1100 B. C. It was situated at the northwest end of the Gulf of Tunis. Like all Phoenician settlements, it acknowledged the rule of Carthage, but the two cities were nearly equal in power. By submitting promptly to Rome in the Third Punic War, Utica gained some Carthaginian territory and was proclaimed capital of the African province. Cato killed himself there in 46 B. C. when Caesar triumphed at Thapsus. Later, it was the residence of a bishop, and it maintained its ecclesiastical supremacy until destroyed by the conquering Arabs in the seventh century.

**Related Subjects.** The reader may consult in this connection the following articles in these volumes:

| | |
|---|---|
| Carthage | Phoenicia |
| Cato, subhead *Marcus Porcius* (95-46 B. C.) | Punic Wars |

**UTICA,** N. Y., a manufacturing city in the eastern part of the state, situated on the Mohawk River and on the New York State Barge Canal, fifty-two miles east of Syracuse and ninety-five miles west by north of Albany, the state capital. Utica is the county seat of Oneida County. It is served by the New York Central, the New York, Ontario & Western, the Delaware, Lackawanna & Western, the Adirondack & Saint Lawrence and the West Shore railroads, and by the Utica & Mohawk Valley electric line. The city is pleasantly situated on elevated ground, and is regularly built. In 1910 it had a population of 74,419, and in 1916 of 85,692 (Federal estimate).

Utica lies in a section of the state where dairying and the growing of flowers and hops are the chief industries. The city is the shipping point for large quantities of cheese, fruit, flowers, especially roses, and manufactured products, and is widely known for its superior woolen, cotton and knit goods. There are over twenty knit-underwear mills here, in which about 7,000 people are employed, and the value of their annual output is estimated at $20,000,000. Other important manufactures are hot-air furnaces, steam-fitting apparatus, marble products, paving material, machine-shop products and firearms.

Utica is noted for the number of its benevolent institutions. It is the seat of the State Hospital for the Insane, the State Home for Aged Masons, Saint Elizabeth's, Saint Luke's, Faxton's and City hospitals, Saint John's, Utica and City orphan asylums, Saint Joseph's Home for Infants, a home for the friendless and one for aged men and women. The educational institutions include Utica Female Academy, Utica Catholic Academy, a training school for teach-

ers and a fine public library. Among notable public buildings are a $1,000,000 county government building, the state armory and the city hall. Roscoe Conkling Park is the largest of thirteen parks, which together comprise 643 acres. D.F.H.

**UTILITARIANISM,** *u til i ta'ri an iz'm,* a doctrine of ethics and philosophy which adopts, as the criterion of right and wrong, the welfare and happiness of the greatest number of the human race. Utilitarians believe that an act is good or evil only to the extent that it proves itself serviceable or detrimental to the welfare of society. The word *utility* was first used in reference to this system by Jeremy Bentham, but John Stuart Mill (which see) first definitely stated the theory. Others identified with the system were Spencer, Locke, Hobbes, Sir James Mackintosh and Sir Leslie Stephen. The philosophy of the ancient Greek scholar Epicurus bears a resemblance to Utilitarianism. See EPICURUS, subhead *Epicureanism.*

**UTOPIA,** *u to'pi a,* a celebrated book by Sir Thomas More, written in Latin, and first published in 1516. Its earliest English translation appeared in 1551. Written in the form of a romance, it is in reality a political treatise, dealing with all the social and economic evils of the times and the remedy therefor.

Utopia is an imaginary island, supposed to have been discovered by one of the companions of Americus Vespucius, and the book describes the ideal state of society which there existed. All goods and property were owned and used in common, and in order to receive their share of supplies all except invalids and the aged were obliged to work for six hours each day. Homes were redistributed by lot every ten years, and people dined together in large halls. One of the noteworthy features of society in Utopia was that it was "lawful for every man to favor and follow what religion he would," though a man might try to convince others of his belief, provided he did it "peaceably, gently, quietly and soberly." Punishment for crimes was as mild as was consistent with justice, and promotion in all offices was by merit.

More's romance was not the first work which had presented such an ideal state of society, its oldest predecessor being Plato's *Republic;* nor was it the last, for men of almost every age have delighted to picture a social order which possessed all the advantages their own did not. Bellamy's *Looking Backward* is the most noteworthy of recent works of such character. The *Utopia* gave rise to the adjective *Utopian,* which to-day is applied to schemes of reform or enlightenment which are considered impractical and visionary.

**UTRECHT,** *u'trekt,* an interesting old city of the Netherlands, capital of the province of the same name. It is situated twenty-two miles southeast of Amsterdam, on the Old Rhine. Since 1723 Utrecht has been the headquarters of the Jansenists (Old Catholics). In 1579 there was formed here the union of the seven Protestant provinces out of which grew the nation of the Netherlands. The treaty which ended the War of the Spanish Succession was concluded at Utrecht in 1713 (see UTRECHT, PEACE OF). Two canals, spanned by many bridges, traverse the city, which contains beautiful parks, promenades and the Malieban, a triple avenue of trees. Among the interesting features are the university, founded in 1636, a museum containing paintings by early Utrecht masters, the royal mint, and the veterinary school; the latter is the only one of its kind in Holland. The industrial establishments include sawmills, machine shops, breweries, carpet works and manufactories of floor cloths, velvets, cottons, linens and musical instruments. Utrecht is the chief railway center of the Netherlands. Population in 1915, 127,086.

**UTRECHT, PEACE OF,** a series of treaties entered into by the belligerent nations at the close of the War of the Spanish Succession (see SUCCESSION WARS, subhead *The War of the Spanish Succession*). Agreements signed at Utrecht in 1713 were supplemented by the Treaty of Rastadt, concluded between Germany and France in 1714, and by the Barrier Treaty of 1715, signed by Austria, England and the Netherlands. The principal terms of the peace were as follows: France agreed that the crowns of Spain and France should never be united under one ruler, and it ceded Nova Scotia, Newfoundland and the territory about Hudson Bay to England. Spain ceded Gibraltar and the island of Minorca to England, Sicily to the Duke of Savoy, and Milan, Naples, the island of Sardinia and the Catholic Netherlands to Austria. Holland was permitted to garrison eight towns on the frontier of the Austrian Netherlands as a barrier against French aggression. This peace marks the beginning of England's colonial and commercial supremacy.

THE WORLD BOOK
ORGANIZED KNOWLEDGE IN STORY AND PICTURE
TRADE MARK REGISTERED

# V v

V is the twenty-second letter of the English alphabet. There was no corresponding letter in the Phoenician alphabet, and in the Greek the letter which resembled *v* in form was a vowel, *u*. In Latin the *V*, as well as the rounded *U* form, was used, but no distinction was made between them in early times, and even in English, after the *v* sound had become well established, the two letters were used interchangeably. Dictionaries and alphabetically arranged lists of words made no distinction between those beginning with these two letters. Not until the seventeenth century were the two permanently differentiated. As regards phonetic value, *v* is closely related to *f*, and in allied languages the two are often confused. The close connection is shown by the substitution of *v* for *f* in the plurals of such words as *leaf, leaves; staff, staves.* *V* has always the same sound, and is pronounced with the upper teeth pressed against the lower lip.

**VACATION SCHOOLS.** See SCHOOL, subhead *Vacation Schools*, page 5241.

**VACCINATION,** *vak si na' shun,* a form of inoculation practiced generally in civilized countries for the prevention of smallpox. It has been the means of vastly diminishing the number of cases of this dread disease, which is now one of the rarest instead of one of the commonest maladies. The principle upon which it is based is that if the individual acquires the disease in a mild form, antitoxins for the cure of the ailment will be manufactured in his own blood and render him immune to attacks of real smallpox for a number of years. The process consists of rubbing or scraping into the skin (usually on the arm) virus taken from the pustules formed on the abdomen of a healthy cow, which has been inoculated with disease germs.

The person vaccinated undergoes an attack of cowpox, or *vaccinia,* which is the cow or horse variety of smallpox. The arm becomes sore and swollen and a vesicle containing a clear fluid forms. A crust then forms over the sore, which, if not pulled off through scratching, will drop off in about two weeks, leaving a scar. In some cases fever, headache and dizziness are accompanying symptoms. There is no danger from this operation, provided the physician uses clean instruments, and the proper precautions are afterwards taken to avoid infection. The directions of the attending surgeon should be carefully followed. Children who are vaccinated must be watched to see that they do not scatch the sore, as infection from finger nails is a source of danger. Vaccination came into general favor through the efforts of Dr. Edward Jenner, an English physician. See JENNER, EDWARD. C.B.B.

Consult Millard's *The Vaccination Question.*

**VACUUM,** *vak' u um,* a term meaning *emptiness* and applied strictly to a space containing nothing. Ordinarily, however, it refers simply to a space where the pressure is appreciably less than that of the atmosphere, as in an engine cylinder. A perfect vacuum has never been obtained, for it is impossible to exhaust all the air from a given space, and even were this possible the ether which fills all space would still remain. But very low pressures may be obtained by special air pumps (see AIR PUMP). Sound and heat and even electricity will not traverse a high vacuum, but the brilliant glow of an electric discharge in a moderately high vacuum is made use of in the vacuum-tube lighting system. The most perfect vacuum so far obtained is that over mercury in a barometer tube (see BAROMETER).

**VACUUM CLEANER,** *vak'u um kleen'er,* an apparatus for removing dust from interior walls and furnishings by suction. It consists of some form of suction fan or air-exhausting pump which draws air through a nozzle. There are several patterns on the market. In the first type that was designed the air pump was operated by a large gasoline engine which was driven on a truck from house to house; connection from the street was made by a long rubber hose, and the dust was drawn through the hose and expelled into a box in the wagon. Later, stationary engines, run by gasoline or electricity and operating a pump connected with a system of pipes leading to the different floors, were used in large buildings.

The most recent development is a small portable machine which may be attached to the socket of an electric lamp. In this form, the motor and suction fan are placed just above the nozzle, which slides on rollers, and the dust passes into a removable bag of closely-woven material, through which the air escapes, the dust being retained. In some of the cleaners, suction is caused by bellows operated by hand or foot power. The vacuum cleaner is part of the equipment of the most modern office buildings, apartment houses and homes, and everywhere is largely displacing the broom. The portable electric cleaners, with several attachments and nozzles of various shapes, range in price from twenty-five to fifty dollars.

**VACUUM PAN,** a device used to evaporate liquids at a temperature less than the ordinary boiling point, especially in the sugar-refining industry. It consists of a closed vessel heated by a steam jacket, which is equipped with an air pump so arranged that the steam and air may be constantly removed from the surface of the liquid. This reduces the pressure on the surface and permits boiling and evaporation of the liquid without danger of its burning. The operation of a vacuum pan is based on the principle that the boiling point of a liquid is lowered as the pressure upon its surface decreases. See Boiling Point; Sugar.

**VALDAI,** *val di',* **HILLS,** a low range in West-Central Russia about midway between the cities of Petrograd and Moscow, which forms a watershed between the Volga and the Dnieper, and the rivers flowing toward the Baltic Sea. These hills extend for about 250 miles, and gradually rise from the surrounding plain to a maximum elevation of 1,150 feet above sea level. Formerly the Valdais were forested, but their slopes have been cleared, and on them hemp, flax and cereals are successfully grown. Copper, iron, magnetite, lead and salt are found in the range.

**VALENCIA,** *va len'shi a,* a city of Spain, capital of the province of the same name, and in population the third city in the kingdom, ranking next to Madrid and Barcelona. It lies on the River Guadalaviar, three miles from the Mediterranean coast and 185 miles southeast of Madrid. The city occupies an attractive site in the midst of a fertile plain. Its ancient walls, originally built by the Romans, were torn down in 1871, and have been replaced by handsome boulevards; two gateways with their picturesque towers are all that remain of the old fortifications.

Within the city one sees a mixture of Oriental civilization and that of the present age. There are rows of white dwelling houses in the Moorish style of architecture, and innumerable domes and towers roofed with gold, blue and white tiles; many of the crooked, narrow streets have been replaced by broad avenues, and the city has such modern improvements as electric tramways, gas and electric plants and good drainage and water-supply systems. The city's many interesting structures include a cathedral, dating from the thirteenth century; a Gothic bell tower 152 feet high; the episcopal palace, with a valuable library; the silk exchange, a handsome building in Gothic style, and the provincial museum, which contains a valuable collection of paintings. Valencia has a university which is now one of the foremost in Spain, and the municipal botanical gardens, outside the line of the old walls, are unsurpassed anywhere else in the country.

The city is an important railway center, and is connected by two lines of railway and two tramways with its port on the Mediterranean. The latter has a spacious and up-to-date harbor. The leading manufacturing enterprise of Valencia is the silk industry, but the place is noted also for the production of colored tiles. It carries on a thriving export trade in oranges and other fruits. Population in 1910, 233,348.

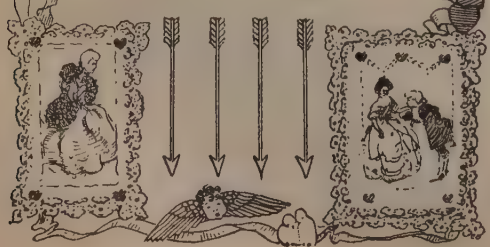
**VALENS,** *va'lenz* (about 329-378), a Roman emperor of the East, brother of Valentinian I, who made him his colleague in 364 and gave him as his territory Thrace, Asia and Egypt. At the outset of his reign a rival, Procopius, had himself proclaimed emperor, and not until 366 was the usurper finally put down. Valens won general popularity in that same year by reducing all taxes one-fourth, but he felt the need of the funds of which he thereby deprived

## *Suggestions for Valentine Observance*

Valentine's Day affords the teacher or mother an excellent opportunity to impress upon the children the lessons of friendship, unselfishness and loving good will. The sentimental idea may easily be kept in the background. For days or even weeks beforehand the "busy work" for the little hands may consist of valentine making, and much of this may be correlated with school subjects. Nothing can be prettier than bird valentines, and the nature-study class may well employ itself in coloring birds, which may then be cut out and pasted on the valentines. Flowers may be treated in the same way, and in both instances care should be taken to have the coloring "true to life."

The sewing class may make heart-shaped satchets, pin cushions, penwipers or even scrapbooks; the manual training class may fashion simple wooden toys, and the cooking class will delight in heart-shaped biscuits, candies or cookies. Even the very little children can make valentines that will be a delight to father or mother or teacher. They may cut from red paper ten or a dozen hearts, print on each one, "Good for a half hour of work," and seal them in an envelope. The work done in response to these "promissory notes" will probably be the most cheerful ever performed by the little valentine makers. Blotting pads of red, ornamented with white hearts, bookmarks, and napkin rings similarly decorated are all very simple of construction. Parents or teachers to whom such tokens are given should take care to make use of them, as nothing so pleases a child as to believe that he has made something which someone could not get along without.

On the afternoon of Valentine's Day, after the legend has been discussed and the doing-for-others idea emphasized, the teacher may arrange an exhibit of valentines, each child contributing his best work.



himself in the contest with the Goths which raged so fiercely during his reign.

The first struggle (367-369) closed with a treaty which made the Danube the boundary between Gothic and Roman territory, but in 376 Valens permitted the Goths, who were driven by the Huns, to cross the Danube and settle in Moesia and Thrace. So many of them came that Valens became alarmed, and his generals treated the newcomers in such a way as to precipitate open war. On August 9, 378, the two armies met near Adrianople, and the Goths gained a complete victory, Valens and about two-thirds of his soldiers perishing on the field.

**VALENTINE,** Saint, a Roman Catholic bishop who was martyred in Rome in A. D. 270, on the fourteenth of February. This day has long been celebrated in a manner not at all serious, by Catholics and Protestants alike. Several explanations are given for the familiar custom of sending anonymous love tokens, cards of greeting and the like to one's favorites, and for the various social activities connected with that day. Some say that Saint Valentine was accustomed to go around from house to house, leaving food on the doorsteps of the poor, and that the custom of sending Valentine greetings anonymously developed from that. Another explanation connects the modern celebration of the day with the observance of the Roman festival Lupercalia, which occurred on February 15. At this time, so the story goes, each of the young men celebrating the festival drew from a box the name of a lady, to whom he was to be faithful for the ensuing year. It is supposed that this custom is the origin of some of the sentimental features of Saint Valentine's Day.

**Valentine Day Suggestions.** The observance of the fourteenth of February can be made very attractive to the children, and they can also gain much good thereby. The suggestions here given are especially for mothers and teachers.

**VALENTIN'IAN,** the name borne by three Roman emperors of the West, only two of whom are of importance historically.

**Valentinian I** (321-375) was of humble birth, but won distinction in the army, and on the death of Jovian, in 364, was chosen emperor. He divided the empire into two parts, surrendering the East to his brother Valens and keeping for himself Italy, Spain, Gaul, Britain and Africa. Throughout the reign of Valentinian the German tribes to the north were very active, ravaging the frontiers, while in Africa risings among the desert tribes were frequent.

Valentinian died of apoplexy during a campaign against the Quadi, a German tribe living in the present Hungary. Many improvements in the administration of law and in everyday life were introduced by Valentinian. He provided free medical attendance for the poor, opened schools and decreed that all judicial proceedings should be public. Although an orthodox Catholic, he allowed complete religious freedom to his people.

**Valentinian III** (419-455) was a grandson of Theodosius the Great, by whom he was raised to the imperial rank in 425. His mother, Placidia, governed for him during his minority; after her death he proved a weak and purposeless ruler. On all sides the empire was being attacked by the barbarians, and although Valentinian's general, Aëtius, won a great victory over the Huns under Attila and defeated the Visigoths in Southern Gaul, the empire had grown too feeble for effective resistance, and Africa was lost to the Vandals, Britain to the Scots and Picts, and much of Spain and Gaul to the Visigoths and Suevi. Taxes throughout the empire were very heavy, and the spirit of loyalty seemed rapidly dying out. Valentinian met his death at the hands of the adherents of Aëtius, whom he had himself murdered.

Consult Gibbon's *Decline and Fall of the Roman Empire.*

**VALERIAN,** *va le'ri an* [Publius Licinius Valerianus] (about 190-260), emperor of Rome from 253 to 260. In 251 he was chosen censor, and under Emperor Gallus held a position of trust in the army. On the death of Gallus he was declared emperor by the soldiers; but though a man of ability and honesty, he was too old and enfeebled to rule at such a troubled time, for the Goths and the Germans were threatening the western provinces and the Persians had taken Armenia. Intrusting the European wars to his son, Valerian went to the East, where after some temporary successes he was taken prisoner. After his death the Persian king had his skin stuffed with straw and preserved in the temple as a sign of triumph.

**VALHALLA,** *val hal'a* (the Hall of the Chosen Slain), according to Northern mythology, the most magnificent palace of Asgard, where Odin feasted with his heroes. The great building had golden walls and a floor and roof of shields. Its ceiling was supported by spears so highly polished that the light from them served to illuminate the hall. Coats of mail and other pieces of armor, the gifts of the god to his men, adorned the walls. So enormous was this great building that it had five hundred forty doors, each so wide that eight hundred men might enter side by side. Long tables set about the hall accommodated the guests, the soldiers slain in battle who had been brought to Valhalla by the Valkyrs (which see). These maidens waited upon the tables and supplied the men with delicious mead, a drink made of honey. For food, they had the flesh of a mighty boar, which daily recovered the flesh he had given to the feast. Every day these heroes rode out to the field, where in pastime they fought and often wounded each other sorely, but they were entirely restored every night after feasting in Valhalla.

**VALKYRS,** *val' kirs,* or **VALKYRIES,** *val kir' iz,* in Norse mythology, were warlike maidens mounted on horses and armed with helmets, shields and spears, who were sent by Odin to every battle field to choose the bravest of mili-

VALKYRS RIDING TO BATTLE
From a painting by Arbo.

tary heroes and carry them to Valhalla (which see). Half of those dead they selected and carried on their fleet steeds over the bridge Bifröst into the hall, where, donning pure white robes, they waited on the heroes during their long feast.

**VALLADOLID,** *val yah tho leeth',* an interesting old city in the northern part of Spain, capital of the province of Valladolid and at one time the seat of government of the whole kingdom. It is situated on the Pisuerga River, 102

miles northwest of Madrid, in the midst of a fertile plain. This city possesses historic and literary interest, for Columbus died and Philip II was born there, and from 1603 to 1606 it was the home of Cervantes, author of *Don Quixote*.

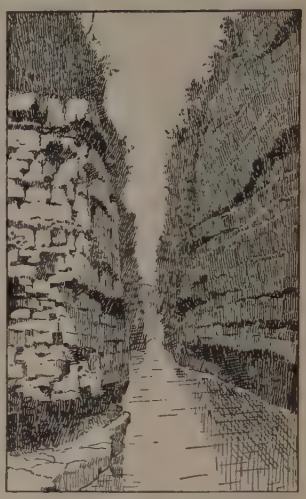
Valladolid has many attractive plazas, parks, arcades, cathedrals and other structures, rich in ornamentation and picturesque courts and façades. Its thirteenth-century Church of San Pablo and the building containing the city offices rank among the world's finest examples of Gothic architecture. Its educational institutions include one of the oldest universities in Europe. The leading articles of manufacture include chocolate, flour, gloves, pottery, iron and metal goods, silks and woolens. Valladolid was the capital of Castile and Leon during the latter part of the Middle Ages, and after the union of Castile and Aragon it was the capital of Spain until superseded by Madrid, in 1560. Population in 1910, 71,066.

**VALLADOLID,** Mexico. See Morelia.

**VALLEJO,** *val la'ho,* Cal., a city in Solano County, in the western part of the state, on San Pablo Bay, twenty-eight miles north of San Francisco. Electric lines extend north from the city. Vallejo is the outlet for one of the finest fruit sections in the state, extensive shipping being carried on through its excellent harbor, which will accommodate the largest seagoing vessels. The city is an important wheat market, and its flour mills, which employ about 300 people, are the largest industrial plants. Tanneries, dairies and fruit and fish canneries are other noteworthy establishments, and in the vicinity is one of the richest quicksilver mines in the United States. At Mare Island, opposite the city, are located the largest United States navy yards on the Pacific coast (see Mare Island).

The prominent buildings are the city hall, public library, Saint Vincent's Academy and the Good Templars' Home, a refuge for orphans. Vallejo, when founded in 1850, was intended for the capital of the state; sessions of the legislature were held here in 1851, 1852 and 1853. It was chartered as a city in 1866, and in 1911 it adopted the commission form of government. In 1910 the population was 11,340; this had increased to 13,461 by 1916 (Federal estimate).

**VALLEY,** low lands between mountains, hills or bluffs. The sides of the valley are known as the *slopes,* and the bottom is called the *floor.* Valleys are formed by folding of the earth's crust and by erosion. Those formed by folding are usually between mountain ranges, and for this reason are designated by geographers as *intermontane* valleys. The most noted example of this variety in America is the great valley between the Cascade and Sierra mountains on the east and the Coast Ranges on the west, extending through the states of Washington, Oregon and California.



NARROW VALLEY

Such a valley, with steep sides, as shown in the illustration, is also known as a gorge. Geographers call it a transverse valley.

Valleys running parallel with the mountain ranges are called *longitudinal* valleys; those running across the ranges are *transverse* valleys. The latter may be caused by breaks in the folds forming the mountain ranges, but they are more often due to erosion. They are usually narrow, with steep slopes, and the floor is only wide enough to contain the river which flows in it.

When of high altitude transverse valleys are called *passes;* when low they are called *water gaps.* Good examples of the latter are the Delaware Water Gap on the Delaware River, the gorge in the Highlands of the Hudson and the channel of the lower Saguenay River in Quebec. Mountain passes have always been of great importance as highways. Among the most noted passes are the Khyber, near Kabul in the Himalayas; the Mont Cenis, Simplon and Saint Bernard in the Alps; the Marshall and Hagerman in Colorado, and the Argentine in the Andes.

Valleys formed by erosion are usually narrow and steep in the upper part of the river's course, and broad, with more gentle slopes, in the lower part of the course. Here the floor of the valley may be broad and level, affording large areas of fertile soil for tillage. In arid regions valleys by erosion are narrow and steep because the stream cuts its channel into the rock more rapidly than the slopes disintegrate by weathering. Very narrow valleys of this sort are called *canyons.* The most noted examples of canyons are the Grand Canyon of the Colorado, in Arizona; the Grand Canyon of the Yellowstone

in Yellowstone National Park, and the Royal Gorge in Colorado.

*Drowned* valleys are those partially under the sea, this condition being caused by the lowering of the coast. Delaware Bay and the fiords of Norway are good examples. *Hanging* valleys

BROAD VALLEY, SHOWING FLOOD PLAIN

are those formed by streams flowing down the sides of mountains. They often contain beautiful cascades. *Glacial* valleys are those that have been formed by glaciers. W.F.R.

**Related Subjects.** The following articles in these volumes may be consulted in connection with this description of valleys:

| | |
|---|---|
| Canyon | Hill |
| Delaware Water Gap | Khyber Pass |
| Erosion | Mountain |
| Fiord | River |
| Glacier | Royal Gorge |
| Grand Canyon of the Colorado | Saint Bernard, Great Simplon |

**VALLEY CITY,** N. D., the county seat of Barnes County, is located in the southeastern part of the state, fifty-eight miles west of Fargo and 135 miles east of Bismarck, the state capital. It is beautifully situated in the valley of the Sheyenne River, and is on the Minneapolis, Saint Paul & Sault Sainte Marie and Northern Pacific railroads. Valley City is the seat of a state normal school whose seven buildings are valued at $300,000, and has a Carnegie Library, Elks' Club, armory, auditorium, two hospitals and two city parks. A flour mill and concrete works are the important industrial establishments. Wheat is extensively cultivated in this section. Population, 1910, 4,606.

**VALLEYFIELD,** *val'i feeld,* a city in the province of Quebec, forty miles southwest of Montreal, at the western terminus of the Beauharnois Canal. It is an industrial center, possessing large flour and cotton mills, foundries and over a dozen lesser plants. There is some iron mining and considerable lumbering in the vicinity. A Roman Catholic cathedral is located here, and there is also a college convent. The city owns its waterworks and electric light plant. Population in 1911, 9,499; estimated, 1917, 10,500.

**VALLEY FORGE,** *val'i fawrj',* a village twenty-four miles west of Philadelphia, on the Schuylkill River, famous as the quarters of the colonial army during the terrible winter of 1777-1778. The suffering of the troops, who were without sufficient food, shoes, and other protection from the cold, was due to the failure of the congressional system of managing the commissary department. No other period of the war so tried the loyalty of the troops, but in spite of great suffering, harsh criticism and even plots directed against his command, George Washington clung to his strategic position throughout the long winter and spring. With the aid of Baron Steuben (see STEUBEN, FREDERICK WILLIAM), by the early summer he had trained his army into an efficient and well-organized body of troops. In June, 1778, the army moved on to Philadelphia.

Seven hundred fifty acres of the old camping ground have been purchased and converted into a state park—the Valley Forge Memorial Park. The erection of a group of memorial buildings has been planned, and there have already been completed the Washington Memorial Chapel

VALLEY FORGE: WASHINGTON'S HEADQUARTERS

and the Cloister of the Colonies. The old stone house used by Washington as his headquarters is still standing. Several arches and statues have been erected, and one of the huts used by the soldiers has been reproduced and converted into a museum of relics.

**VALOIS,** *va lwah',* HOUSE OF, a branch of the Capetian family which ruled in France from 1328 to 1589. On the death of Charles IV in 1328 without male heirs, his cousin, the grandson of Philip III, came to the throne as Philip VI. Edward III of England, a grandson of Philip IV, also laid claim to the French crown,

and the result was the disastrous conflict known as the Hundred Years' War (which see). Philip's successors in the direct line were the following:

John (1350-1364)
Charles V (1364-1380)
Charles VI (1380-1422)
Charles VII (1422-1461)
Louis XI (1461-1483)
Charles VIII (1483-1496)

On the death of Charles VIII without male heirs the succession passed to Louis, Duke of Orleans, great grandson of Charles V, who became Louis XII and founded the House of Valois-Orleans. He died in 1515, leaving no son, and Francis of Angoulême came to the throne as Francis I, the first of the Angoulême branch. His successors were Henry II (1547-1559), Francis II (1559-1560), Charles IX (1560-1574) and Henry II (1574-1589). At Henry III's death the Bourbon family, in the person of Henry IV, came to the throne.

The important members of the House of Valois are treated in these volumes under their respective names.

**VALPARAISO,** *vahl pah rah e'zo,* the capital of the province of Valparaiso, and next to Santiago the largest municipality of Chile, is a prosperous city with a population of 187,240 (1914). It is the chief port of the republic, situated on a spacious inlet of the Pacific Ocean, sixty-eight miles in a direct line, and 116 miles by rail, from Santiago, which lies to the southeast. The view of the city from the harbor, which is sometimes compared to the Bay of Naples in beauty, is very attractive. Along the shores of the bay are the level sections containing the business quarters, and on the slopes of the surrounding hills are beautiful residence districts.

The deep, commodious harbor is semicircular and opens to the north, and during the months of July, August and September, when the worst storms occur, much damage has resulted to ships anchored in the bay. A vast scheme of improvement was inaugurated in 1912, and the work was still in progress in 1917. This plan includes the construction of a breakwater about 1,000 feet long, a quay wall 2,000 feet long, a large jetty with quays on both sides, warehouses and other structures. A space of 220 acres will ultimately be made safe for ships at all seasons of the year. Extensive port improvements are also being made at San Antonio, forty miles to the south, with the idea of diverting from Valparaiso a portion of the traffic. In 1917 the establishment of a government-chartered steamship line between New York and Valparaiso was announced by the United States Shipping Board.

The city has excellent telegraph and cable service, and is connected by wireless with the Juan Fernandez Islands, of *Robinson Crusoe* fame. It has rail communication with Santiago, and is connected with Buenos Aires by the transcontinental railroad and the Andean tunnel, opened in 1910. A branch line runs to Los Andes and the mining section. Valparaiso is a manufacturing center of considerable importance, the chief products including cotton goods, machinery, tobacco goods, refined sugar and liquor. It has the public buildings and educational institutions typical of a progressive city of its size, and the best-equipped tuberculosis sanitarium in South America. The place was founded in 1536 by Juan de Saavedra. It has several times been visited by earthquake shocks, and was partly destroyed in 1906 by an especially severe quake. J.S.C.

**VALPARAISO,** *val pa ra'zo,* IND., the county seat of Porter County, and the seat of Valparaiso University, is in the northwest corner of the state, forty-four miles southeast of Chicago. It is served by the Grand Trunk, the New York, Chicago & Saint Louis and the Pennsylvania Company railroads, and has electric interurban service. Features of the city are Saint Paul's Academy, the Christian Hospital, a courthouse and public library. Although principally residential, the city has manufactories of Chautauqua educational specialties, mica, paints and varnishes. The surrounding section is agricultural. Valparaiso was founded in 1836 and was incorporated in 1856. Population, 1910, 6,987. See VALPARAISO UNIVERSITY.

**VALPARAISO UNIVERSITY,** an institution established in 1873 by private enterprise, at Valparaiso, Ind., a distinguishing feature of which is its lack of entrance requirements. The university has very moderate tuition and boarding fees, and has been of great benefit to many students with limited opportunities for an education. When opened, the institution was mainly a teachers' preparatory school, but it has developed into a university with twenty-six departments, including both general and professional courses. There are about 220 instructors and a student enrollment approximating 6,000. The university library contains 15,500 volumes.

**VALUE,** *val'u,* in economics, is the worth or desirability of a commodity, measured by the amount or quantity of other articles which can be exchanged for it. Since the time of John

Stuart Mill there have been numerous changes in the theory of value. Mill said that value is the command which the possession of a thing gives over purchasable commodities in general. But a coat may sell for the equivalent of 100 loaves of bread this year, and for 150 loaves next year; for 100 square feet of glass this year and only fifty square feet next year. Mill was unable to say whether the value of the coat was more or less in a year's time; only if the coat, for some reason, exchanged for less of all commodities could we say that its value had fallen. This is a cumbersome method of stating the fact, which is now generally accepted by economists, that value is relative to a fixed standard. This standard is *money,* and value in terms of money is *price.* Value and price are constantly interchanged in popular language, but they are not the same thing.

**Value and Utility.** In order to possess value in this sense a commodity must have utility and scarcity. Ordinarily when men speak of value they mean the *usefulness* of an article, but in economics value and utility are different. The utility of an object is its *value in use,* the measure of its necessity to man, while the *value* of an article is measured by its power to create effective demand for it, by the sacrifice which a man is willing to make to obtain it. The demand must be effective; it must be more than a wish. Some commodities may be useless in the ordinary sense of the word, yet they may have value beyond the power of many people to possess them. Beautiful paintings, rare books and gems are examples of this class; Rosa Bonheur's painting, *The Horse Fair,* once sold for $290,000, is an example; a single book, a Bible printed by Gutenberg, sold for $50,000.

But even usefulness is not enough to make a commodity valuable. For example, nothing is more indispensable to man than air, but nobody buys and sells air. In most parts of the United States water is plentiful; in most cities and in dry regions, many people buy water. Besides being useful, a commodity must require effort to obtain it, if it is to have value.

**Supply and Demand.** In one sense value is found in the law of supply and demand. Other factors being equal, value increases with the increase in demand, and decreases with increase in supply. If the commodities may be produced at a constant cost, the cost of production determines the value. For example, if the market value is not high enough to cover the cost of production, some manufacturers will transfer their activities to other industries, thus causing a decrease in the supply, followed by a rise in value. This is usually called the *cost of production* theory of value.

**Labor Theory of Value.** There is another explanation of value, the so-called *labor theory.* This theory is now not considered of scientific importance, but historically it deserves attention. Adam Smith argued that in a primitive society the amount of labor used in producing an article was the measure of its value. This theory was taken by Karl Marx and others as the basis of scientific socialism. Labor alone, said Marx, creates value, and capital merely takes from labor its just fruits. This argument disregards articles made at fluctuating labor cost, articles which are unique and cannot be reproduced, and articles which nature supplies in quantities insufficient to meet the demand. That labor is necessary to create value is true, but most economists agree that capital is also needed. W.F.Z.

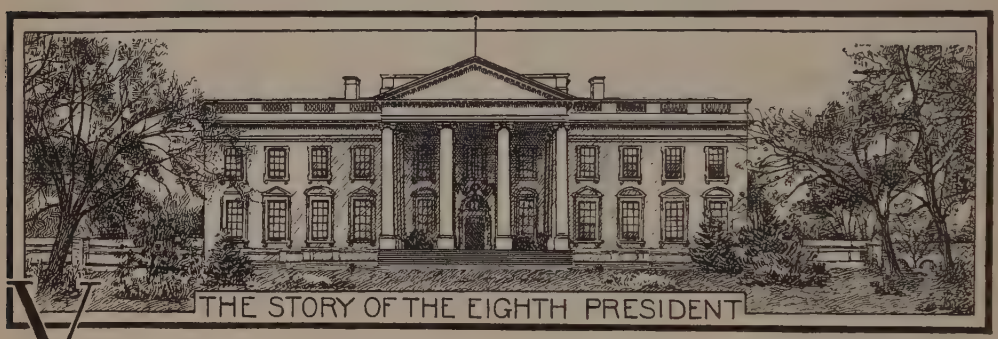
Consult Davenport's *Value and Distribution;* Smart's *Introduction to the Theory of Value.*

**VALVE,** a term applied to various mechanical devices to control the flow of fluids in pipes or vessels. In physiology the word is applied to similar natural formations, such as the heart valves. There are several forms of valves, including the (1) *automatic,* which are opened and closed by the pressure and back-pressure of the fluid, as those in the hydraulic press, the pump and the heart; (2) *nonautomatic,* which are operated by hand or some outside force, as those in the water faucet and the pinchcock, or the valves of musical instruments; (3) *sliding,* like those of a steam-engine cylinder.

**VAM'PIRE,** according to a superstition still found among the Russians and the people of Southeastern Europe, a corpse which comes from its grave at night to suck the blood of living people, especially of young persons. According to the absurd belief, so quietly does it work that the victim is not aware of what is happening, but gradually wastes away and dies. Then the corpse becomes a vampire. But it is not only innocent persons who have been preyed upon by vampires who become those horrible creatures at death; witches, suicides and certain criminals also receive at death the power to prey upon humanity. The only way to prevent the crimes of a vampire is to dig up the corpse, burn the head and heart, and bury the body with a stake through it. It was long the custom to bury suicides and criminals with a stake driven through their vitals.

**VAMPIRE BAT,** the name applied to two species of bloodsucking bats found in Central America and tropical South America, which attack fowls, men and other warm-blooded animals. The common vampire bat is a small, reddish-brown animal, about three inches long, with large, spreading ears, a sharp tip on the nose, and keen, triangular front teeth, which inflict razorlike wounds. Its food canal is too narrow for the passage of anything but blood. It is said that the bats sometimes attack people who are sleeping, and that they can suck a considerable amount of blood before the victims awake. The sickness which follows the attack of these creatures, however, is due to inflammation more than to blood loss. These bats have been confused with fruit-eating varieties for years, and fabulous stories are told about their malignance. Their peculiar name is derived from the superstitious legend of the vampire (which see).

**VANADIUM,** *va na' di um,* a rare metal resembling silver in appearance. It is five and one-half times heavier than water. Vanadium never occurs free in nature, but exists in small quantities in certain ores of copper, lead and iron, from which it is extracted with great difficulty. When a compound of vanadium and chlorine is heated in hydrogen, the free metal appears in the form of a silver colored crystalline powder. As a metal it is of no practical value, but a number of its components are used in the arts. A compound of vanadium and ammonium is used in the manufacture of black aniline dye and in making vanadium ink. An acid which exists in the form of a bright yellow powder is used as the substitute for gold bronze, and some of its compounds are used sparingly in medicine. Metallic vanadium is often added to steel, to which it gives unusual strength and elasticity, qualities especially desirable in the making of automobiles.




**VAN BUREN,** Martin (1782-1862), an American statesman, eighth President of the United States. "Little Van," or "the Little Magician," as he was often called, was one of the most able politicians in American history. He was for years a member of the famous "Albany Regency," which controlled New York politics, and was popularly known as its "director;" but he was far more than a politician, for he combined the statesman's foresight with the politician's tact. As to men and unimportant measures he was often silent, but on fundamental questions he was bold in championing even the unpopular side. Against every possible attack he held to his principles, "to which he adhered in evil or good report."

Throughout his long life Van Buren suffered from many political accusations, but his private life was above question. Although economical by nature, he lived easily in the state of a gentleman, and in social intercourse he was always courteous and dignified. Intensely partisan though he was, he never allowed political opinions to intrude on his personal friendships. His great rival, Henry Clay, was also one of his closest friends. His tact stood him in good stead no less with his political opponents than with judges or juries before whom he expounded a case. Although never rhetorical, he had a disconcerting habit of striking at the point, a habit which won cases for him as well as votes for laws he sought to have enacted. Take him all in all, he stands well to the front among the Presidents.

Martin Van Buren was born at Kinderhook, Columbia County, New York, on December 5, 1782. His father, Abraham Van Buren, was a small farmer. Martin received some elementary training in the village schools, but at the age of fourteen began to work in the office of a local attorney. There he stayed for six years, beginning as office boy, then serving in turn as

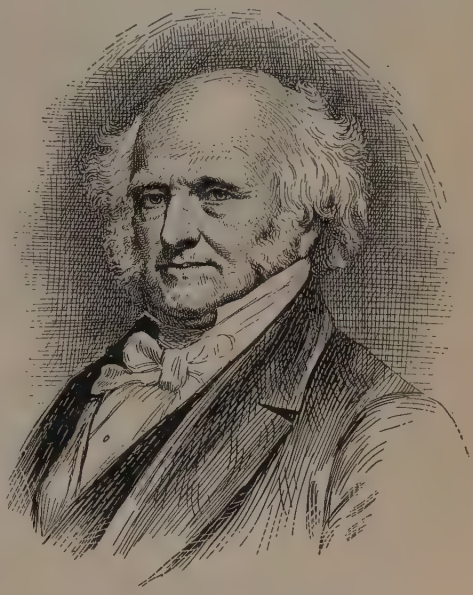
lawyer's clerk, copyist of pleas and finally special pleader in the constables' courts. He early showed an unusual zeal in his law studies as well as an interest in public affairs and a fondness for extemporaneous debate, with the result that he was only eighteen when he was chosen to sit in a local nominating convention. In 1802 and 1803 he was in a New York law office, associated with friends of Aaron Burr, and in the latter year he was admitted to the bar. He then returned to Kinderhook and began to practice law in partnership with his half brother, James Van Allen.

The brief association with Burr's friends seems to have had little influence on Van Buren, for immediately on his return to Kinderhook he became active in politics as a supporter of Thomas Jefferson. He gave assistance in 1803 to Morgan Lewis, who opposed Burr for the governorship of New York, but in 1807 he supported Daniel D. Tompkins against Lewis, the latter having come to be considered as less truly Jeffersonian than he was a few years earlier. Van Buren's legal activities kept pace with his political advancement, and in the winter of 1806-1807 he removed to Hudson, the county seat of Columbia County. In February, 1807, he married Hannah Hoes, a distant relative on his mother's side, and later in the year was admitted to practice in the state supreme court.

In the factional politics of New York for the next twenty years Van Buren was not merely active, but was finally dominating. As a result of Tompkins' victory over Lewis in 1807, Van Buren in 1808 became surrogate of Columbia County, his predecessor being his half brother and partner Van Allen. In 1813, however, the tables were turned, and Van Buren was replaced by Van Allen. In the meantime, in 1812, Van Buren was elected to the state senate. In that body he bitterly opposed the efforts of the "Bank of America" to obtain a state charter and to take the place of the Bank of the United States, and he approved the action of Governor Tompkins when the latter brought the session of the legislature to a sudden close in order to prevent the passage of the bill granting a charter.

During the War of 1812 Van Buren was generally ranked among the supporters of the administration, but he did favor the election of DeWitt Clinton to the Presidency in 1812. In 1815, while still a member of the state senate, he was appointed attorney-general of New York, and in 1816 he was reëlected to the senate for a four-year term. In the same year he was appointed one of the regents of the University of New York. He remained as attorney-general until 1819, when a quarrel with Governor Clinton over patronage led the governor to remove him. In spite of Van Buren's opposition, Clinton was reëlected governor in 1820, and promptly again offered the attorney-generalship to Van Buren, but the latter declined it.

During these years the uncertainties of politics gave Van Buren a fertile field in which to test his genius for leadership. It was the "era of good feeling," when old party lines were broken down; bitter personal antagonisms, however, made sharp political divisions. There were in New York at least five distinct political groups. Out of this confusion Van Buren in 1820 succeeded in persuading the legislature to reëlect Rufus King to the United States Senate, and in 1821 was himself elected as King's colleague.



MARTIN VAN BUREN
One of the greatest of Americans, but unfortunate in his term as President because of what he inherited from his predecessor.

In the Senate he was at once appointed to the important committees on the judiciary and finance; of the former he was chairman for many years. He was overshadowed, naturally enough, by Webster and some of the older statesmen, but he won recognition quickly for his good qualities, and also for a certain independence which was always characteristic of

him. He was a "party man," and he knew how to whip the members of his party into line, yet he could maintain party discipline and occasionally vote against his party. He possessed a great gift—the knowledge of when to talk and when to keep still; and when unimportant matters went contrary to his liking he merely passed them by. On all questions he favored a strict construction of the Constitution.

Reëlected to the Senate in 1827, he resigned in 1828 to become governor of New York. Up to this time he had maintained his law practice, but after beginning his service as governor he gave it up. As governor he advocated two plans which were far ahead of their day. First, he urged the adoption of the "safety-fund system," which would make all the state banks the "mutual insurers of each other's soundness." The principle underlying this proposal was incorporated in the Federal Reserve Act of 1913. Second, he recommended the separation of state and national elections, a plan which has not yet been widely adopted, but is now recognized as essential to good government.

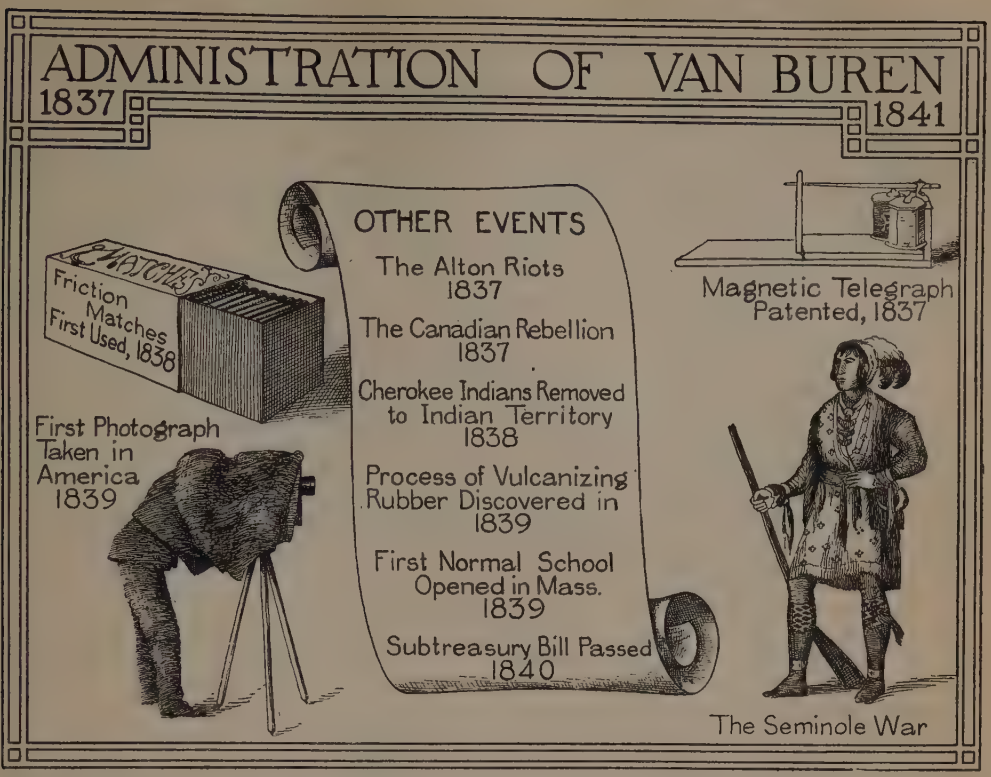
In 1829, after having given Jackson zealous support in the Presidential election, Van Buren was called to Washington to serve as Secretary of State in Jackson's Cabinet. But this office he held only two years, for he resigned in June, 1831, and was sent as minister to Great Britain. After Van Buren sailed, the Senate refused to confirm the nomination; John C. Calhoun, then Vice-President, cast the deciding vote. A thin pretext was found for this action, but the real reason was an attempt to discredit Van Buren in the eyes of the people. Van Buren had resigned from the Cabinet because he wanted to be a candidate for President in 1836 and because he feared that his continued association with Jackson might in some way compromise either the administration or himself. The mission to England was calculated to keep him free of factional disputes at home and thus insure his nomination and election after Jackson had been allowed a second term, to which it was generally conceded he was entitled.

Such was Van Buren's reasoning, and such, too, was the reasoning of the Whigs when they decided to refuse confirmation. But this bit of petty politics proved a boomerang. Van Buren won greater popularity than he had ever enjoyed previously, and with Jackson he became a sort of symbol for the Democratic party. In 1832 he was elected Vice-President, with Jackson as President. In spite of the opportunity to revenge himself on the body which had rejected him as minister to Great Britain, he presided over the Senate with unvarying, unruffled fairness. He took little part in the discussion of public questions, but gradually became marked for succession as the leader of his party. He was nominated for the Presidency in 1835, and was elected in 1836. He had a majority of forty-six electoral votes over his four competitors, the ballots being 170 for Van Buren, seventy-three for William Henry Harrison, twenty-six for Hugh L. White of Tennessee, fourteen for Daniel Webster and eleven for W. P. Mangum of South Carolina. These four candidates, who were all Whigs, had a combined popular vote of 736,656 to 761,549 for Van Buren.

## *The Administration of Martin Van Buren, 1837-1841*

**The Financial Crisis of 1837.** At the very outset of his administration Van Buren was confronted by the disastrous panic of 1837. This was due, in some degree, to Jackson's financial policy. When Jackson, in 1833, removed the government's funds from the Bank of the United States, he ordered them deposited in certain "pet banks," which used them unwisely to stimulate trade and speculation. The panic, however much it may have been immediately due to these actions, had deeper causes. It was due to over-speculation in land, excessive expenditures for public improvements, a failure of the wheat crop in the preceding year, "wildcat" banking, and finally to a financial crisis in England. It was the first crisis of its kind in the United States, and its full force was felt by the Van Buren administration. Necessary foodstuffs and other commodities went to unheard-of high prices, commercial firms, brokers and banks failed by scores, great distress was prevalent among the poor, and specie payments were suspended.

**The Independent Treasury.** The seriousness of the financial situation, particularly in view of the United States Treasury's intimacy with some of the banks which failed, led Van Buren to call a special session of Congress. In his first message, September 1, 1837, he struck the keynote of his administration. First he analyzed the panic and its causes, and then explained his favorite plan for an independent treasury to receive and pay out government funds. The idea was not new, but the govern-




ment in practice had departed from it until Congress had finally given orders, in Jefferson's administration, to keep the government revenues in the Bank of the United States. Van Buren believed that the independent treasury was essential to the public welfare, but it took him three years to get the approval of Congress. The independent treasury bill was signed on July 4, 1840. Against Van Buren had been his doubting friends, his political enemies, and the financial interests of the country, but he stood firm and finally won the victory.

**Other Political and Social Disturbances.** Viewed in the perspective of more than three-quarters of a century, the establishment of the independent treasury was the chief event of Van Buren's administration and the great achievement of his public career, but at that time there were other disturbances, some of them connected with the panic, which seemed equally important. The slavery issue was the subject of intense discussion, and violence resulted; among the disturbances were riots at Alton, Illinois, ending in the murder of Elijah Lovejoy; the mobbing of William Lloyd Garrison in Boston, and anti-abolitionist riots in Philadelphia.

Other symptoms of social and economic disorder were the "buckshot war" in Pennsylvania, the "broad seal war" in Rhode Island, the antirent disturbances, or "patroon war," in New York, and the persecution of the Mormons in Missouri. There was trouble on the border, too, caused by the Canadian Rebellion of 1837; in New York there were feeble attempts to aid the rebels, and the "Caroline affair" for a time threatened serious consequences (see Rebellion of 1837). In 1838 and 1839 occurred the "Aroostook War" in Maine, a feature of the long-standing boundary dispute with Canada. In Florida the second Seminole War, the most costly and most desperate Indian war in the history of the United States, was being carried on, and not until 1842 were the Indians conquered and compelled to move to Indian Territory, now Oklahoma (see Osceola). On the southwestern border at the same time were serious disturbances which ultimately led to war with Mexico. The property and lives of Americans in Mexico were in constant danger, chiefly because the Mexicans resented American recognition of Texan independence.

**Inventions and Discoveries.** During Van Buren's term a number of important inventions

# *OUTLINE AND QUESTIONS ON MARTIN VAN BUREN*

## *Outline*

### I. Years of Preparation

(1) Birth and family
(2) Education
  (a) Scanty schooling
(3) Work in law office
  (a) Rise from position of office boy to that of special pleader
  (b) Admitted to bar
(4) Early political activities
  (a) Support of Jefferson
  (b) Dominant position in New York factional politics

### II. In Public Life

(1) In state senate
  (a) Opposition to "Bank of America"
(2) As attorney-general of New York
  (a) Quarrel with Clinton, and resignation
(3) In United States Senate
  (a) On important committees
(4) As governor of New York
  (a) Progressive policies
(5) Secretary of State in Jackson's Cabinet
(6) Appointed minister to Great Britain
  (a) Reasons for refusal of Senate to confirm nomination
(7) Elected Vice-President
(8) Election of 1836
  (a) Candidates
  (b) Result

### III. Administration

(1) The Panic of 1837
  (a) Causes
    1. Wildcat banking
    2. Land speculation
    3. Public improvement expenditures
    4. Panic in England
  (b) Results
    1. Independent treasury bill
(2) Important internal affairs
  (a) Slavery agitation
  (b) Second Seminole War
  (c) Inventions
    1. Magnetic telegraph
    2. Friction matches
    3. Photography
    4. Vulcanized rubber
  (d) Steamship connection with Europe established
  (e) Trouble with the Mormons
(3) Friction between United States and Mexico
(4) Election of 1840
  (a) Candidates
  (b) Outcome

### IV. Later Life

(1) Principles
  (a) Tariff for revenue only
  (b) Opposition to annexation of Texas
(2) Nominated for Presidency
(3) Death and character

## *Questions*

Which of the following men belonged to the same political party as Van Buren: Jefferson; Jackson; Madison; Taylor; Polk; Pierce?

How many other Presidents were born in the same state as Van Buren? (See list with article PRESIDENT OF THE UNITED STATES.)

What were Van Buren's popular nicknames?

How many times was he nominated for the Presidency? What cost him the nomination in 1844?

What was Van Buren's attitude toward Lincoln and the War of Secession?

Who was Osceola, and what part did he play in the events of this administration?

What article which renders many household tasks easier and safer was never known before the days of this administration?

What was the "Caroline affair," and how did it almost involve the United States in difficulties with Canada?

were given to the world. The magnetic telegraph was patented in 1837; friction matches were first used in 1838; the first photograph in America was taken in 1839; and in the same year the process of vulcanizing rubber was discovered. Regular steamship connection between the United States and Europe was also established, the first steam vessel having crossed the ocean but a few years before.

**The Election of 1840.** The independent treasury was Van Buren's greatest work, but it did little more than add to his unpopularity in 1840. Although he was in no way responsible for the panic of 1837, its shadow hung over him in 1840. In the election of 1840 Van Buren polled nearly as many popular votes as William Henry Harrison (1,128,702 to 1,275,017), but he had only sixty electoral votes to 234 for Harrison. Van Buren was not soured by this defeat, but retired cheerfully to Lindenwald, a beautiful estate which he had purchased near his birthplace, and there lived the rest of his life.

## *Later Public Career*

Van Buren's retirement to Lindenwald was only temporary. At the end of his term he was a vigorous man, in the prime of life, and it was impossible for him to withdraw from public life. For twenty years he continued to wield considerable influence.

In 1843 he announced his clear-cut views in favor of a tariff for revenue only. But he broke with the majority of the Democrats when he opposed the annexation of Texas. This stand cost him the Democratic nomination for President in 1844. Van Buren's friends, however, gave loyal support to Polk, and insured the latter's election by carrying New York for him.

Van Buren continued to figure in public life, and in 1847 announced his approval of the principle of the Wilmot Proviso (which see). The extension of slavery was the rock on which the Democrats now split. In June, 1848, a convention was held at Utica, N. Y., to organize Democratic opposition to General Lewis Cass, who had disavowed the Wilmot Proviso. In spite of Van Buren's refusal, this convention nominated him for President, and in August, 1848, a "Free-Soil" national convention at Buffalo reaffirmed the nomination. Van Buren received no electoral votes, and fewer than 300,000 popular votes. This number, however, was enough to give the victory to Zachary Taylor.

After this defeat Van Buren ceased to play an active part in politics. Except on the question of slavery he was still a Democrat, and he voted for Franklin Pierce in 1852 and for Buchanan in 1856. In 1860 he voted against Lincoln, but after the war began he gave Lincoln his hearty support. Van Buren was buried at Kinderhook, N. Y., his birthplace. W.F.Z.

Consult Alexander's *Political History of the State of New York;* MacDonald's *Jeffersonian Democracy.*

---

**VANCOUVER,** *van koo'ver,* a city in British Columbia, the metropolis of the province and the fourth largest city in the Dominion of Canada. It is exceeded in size among Canadian cities only by Montreal, Toronto and Winnipeg. In commercial importance Vancouver ranks about as it does in population. It is the western terminus of five lines of railway: the Canadian Pacific, Canadian Northern, Northern Pacific, Great Northern and Pacific Great Eastern. It is also the western terminus of the British Columbia Electric Railway, which extends for 112 miles up the Fraser River to Chilliwack and New Westminster. It is the eastern terminus of many steamship lines, whose boats run regularly to many points on the Pacific coast, to Alaska and the United States, and far away to China, Japan, India, New Zealand, Australia and the small island groups of the Pacific. It is the North American port nearest to the Orient. Between Vancouver and Victoria a daily ferry service is maintained.

The city lies on the north shore of Burrard Inlet, which is an eastward extension of the Strait of Georgia. It has one of the finest natural harbors in the world. This has been improved by the construction of docks on both shores of Burrard Inlet, that is, both in Vancouver proper and in North Vancouver. South Vancouver, which adjoins Vancouver, also has a fine series of jetties, partly completed in 1917 by the Dominion government. The city naturally has a large foreign trade, averaging $50,000,000 a year; the imports form about sixty per cent of the total. Vancouver is also a wholesale and manufacturing center, notably for canned fish, lumber, shingles and other lumber products. Wooden and steel ships, structural steel, furniture, and machinery of various kinds are im-

portant items of industry, as is also refined sugar. In and near Vancouver are a large part of the British Columbia fisheries, the principal catch being herring, salmon and halibut.

The city has many interesting features, foremost of which is Stanley Park, comprising about 900 acres, much of it covered with virgin forest. English Park lies on the outskirts of the city. There are many fine structures, including the Canadian Bank of Commerce, the Bank of Montreal and the Merchants Bank among the office buildings, and the customhouse, general hospital, public library and courthouse among public buildings. The University of British Columbia, opened in 1915, is the leading educational institution of the province.

Vancouver was named in honor of Captain George Vancouver. It was laid out by officials of the Canadian Pacific Railway in 1885, and was incorporated in 1886, its population then being about 600. In the same year it was practically wiped out by a fire, but out of the ruins of the wooden shacks rose new stone and brick structures, which have made Vancouver one of the most substantial cities of the Dominion. Well-paved streets gradually replaced dirt roads; electric light and power, sewerage and water systems and street tramways were introduced one by one, until Vancouver became a truly modern city. It grew rapidly from the beginning, and its increasing commercial and industrial importance, added to its pleasant climate, made it a magnet for thousands of people from all parts of the Dominion. Population in 1901, 27,010; in 1911, 100,401; in 1916, estimated, 140,000. W.F.Z.

**VANCOUVER,** GEORGE (1758-1798), an English explorer, for whom Vancouver Island was named. He served with Captain Cook on his second and third voyages, and in 1791 was sent to Nootka Sound, by way of the Cape of Good Hope, to receive formal transfer of land over which Great Britain and Spain had been disputing. On the way he surveyed and made maps of a part of the New Zealand coast. In 1792 he passed through the Strait of Juan de Fuca, discovered the Gulf of Georgia and first circumnavigated Vancouver Island. During the next three years his explorations of the Pacific coast extended from 36° to 56° north latitude. He finally reached England again, by way of Cape Horn, in October, 1795. The record of these years, entitled *A Voyage of Discovery to the North Pacific Ocean and Round the World in the Years 1790-'95,* are valuable historical sources.

**VANCOUVER,** WASH., the county seat of Clarke County, is in the extreme southwestern part of the state, 125 miles south of Olympia, the state capital, and opposite Portland, Ore., on the Columbia River. It is served by the Northern Pacific and the Oregon-Washington Railroad & Navigation Company and by lesser railroad and boat lines. Between Vancouver and Portland is a splendid, double-track steel bridge. The population of the city was 9,300 in 1910, and 12,770 in 1916 (Federal estimate). Vancouver Barracks, located here, is one of the army posts of the United States. The city has also Providence Academy, the state schools for the deaf and blind, Saint Joseph's Hospital, a Carnegie Library and a $100,000 high school building. In the business section is Central Park. Lumbering, farming, fruit raising and dairying are the supporting industries of this section, and the city has packing plants, railroad shops, a creamery and novelty works. The Hudson's Bay Company founded Vancouver in 1828. It was incorporated as a town in 1858 and became a city in 1890. H.R.P.

**VANCOUVER ISLAND,** the largest island on the west coast of North America. Although its southern end extends below the forty-ninth parallel, which is the international boundary on the mainland, the whole island belongs to Canada and constitutes an important part of the province of British Columbia. In fact, the first settlement within the boundaries of the present province was made on Vancouver Island. The island is about 285 miles long, and from forty to eighty miles wide, its axis being parallel to the shore of the mainland. Its area is 15,937 square miles. Separating Vancouver Island from the mainland on the north and east are Queen Charlotte Sound and the Strait of Georgia, both studded with smaller islands. On the south lies the Strait of Juan de Fuca, which is the lane by which steamers reach Vancouver, Victoria and ports on Puget Sound.

**Physical Features and Climate.** Vancouver Island is the southern end of a partially submerged mountain chain usually called the Island, or Vancouver, Range. The summits of this range rise sharply from the waters of the Pacific Ocean; the Victoria Peaks, 7,484 feet above sea level, rise in latitude 50° 4′ north, and are the highest point on the island. Dangerous reefs and rocky islets border the western shore, which is penetrated by many winding, fiordlike bays. Quatsino, Nootka and Barkley sounds cut into the very heart of the island. The eastern shore is less rugged and broken,

and has occasional level stretches to the southeast. The summers on the island, because of the Japan Current, are delightful. Indeed, there is practically no winter in the southern part, in the vicinity of Victoria, but in the northern and western mountains the winters are often severe.

**The Island's Resources.** Scattered among the mountain peaks are narrow, fertile valleys, suitable both for grazing and for planting. The slopes of the mountains are covered with magnificent forests of fir and other cone-bearing trees. Lumbering, which centers at Comox, is the chief industry, but mining is important. The Vancouver coal fields supply a large part of the fuel used on the Pacific coast. Nanaimo is the chief port of shipment for coal. Gold is found in the rivers, and at one time placer mining was the only industry on the island. About 1860, when this industry was at its height, the annual yield was from $3,000,000 to $4,000,000, nearly ninety per cent of the total output for Canada; the only other province then yielding gold was Nova Scotia. Copper is also abundant, and has been steadily increasing in importance since 1900. The short, swift streams not only bear gold but abound in fish, as do also the many pretty mountain lakes. Salmon, herring and sturgeon are plentiful, and there is also an abundance of big game.

LOCATION MAP

Vancouver Island is nearly as large as the combined areas of New Hampshire and Vermont, and nearly eight times as large as Prince Edward Island.

**History.** The island was discovered in 1774 by the Spanish explorer Quadra, but was not circumnavigated until 1792, when George Vancouver gave it his name. The United States claimed the island as well as the adjacent mainland, but surrendered its claims in 1846 by the Oregon Boundary Treaty. The first settlement was made in 1843 at Victoria, which is now the capital of British Columbia. Up to that time the island had been visited only by the trappers and traders of the Hudson's Bay Company, to whom the island belonged. In 1849 Vancouver Island was made a British colony, and in 1866 was united with the settlements on the mainland to form the colony of British Columbia (which see). Victoria, Nanaimo, Alberni, a port on the Pacific side, Comox and Esquimalt, the naval base, are the principal settlements. There is daily ferry service to the mainland, and a railroad runs from Victoria northward to Alberni.

Consult Newcombe's *The First Circumnavigation of Vancouver Island.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| British Columbia | Vancouver |
| Esquimalt | Vancouver, George |
| Nanaimo | Victoria |

**VAN'DALS,** a Germanic people who in the early part of the Christian Era occupied Northeast Germany, between the Oder and the Vistula rivers. They spread into Silesia and Pannonia during the Marcomannian wars, and in 406 devastated Gaul and entered Spain, fighting the Suevi and the Goths and Romans. Under Genseric they invaded Africa in 429. Genseric was small and lame, but was so cruel and crafty that he was worshiped by his men and held in terror by all others. Carthage became the Vandal stronghold, and the Christians were mercilessly persecuted. In 455 Genseric sacked Rome. He abandoned the city to his soldiers for two weeks, and they plundered and ruined temples, works of art and beautiful buildings. To-day those who wantonly engage in devastation of this sort are called *vandals.* The Vandal kingdom was overthrown in 534 by Belisarius, a general of the Emperor Justinian. See GENSERIC.

**VAN'DERBILT,** the name of a family in the United States that for nearly one hundred years has exercised a powerful influence upon business and finance. The representatives of the family named below are its most important members:

**Cornelius Vanderbilt** (1794-1877), founder of the family fortune, was born near Stapleton, Staten Island, N. Y. With little opportunity for education, he became a ferry boy between Staten Island and New York City at the age of sixteen; at eighteen he owned three ferries and at twenty-one was the possessor of a large fleet of harbor boats. By 1829 he had gained control of the steam-ferry industry about New

York, was competing so fiercely with the Hudson River lines that he soon acquired them, and before 1850 had established regular service on the Delaware River and from New York to Boston. His fleet was then the largest of its kind in the world, and the title of "Commodore" was appropriately granted him by the public.

CORNELIUS VANDERBILT
The founder of the family fortune.

Having established during the next few years an overland route by way of Lake Nicaragua to California and a highly successful line from New York to Havre, he began about 1861 to transfer his interests from steamboats to railways. In 1869 he was elected president of the New York Central Railroad. He was a man of daring originality, and yet is said never to have lost in any operation undertaken. He left a fortune of about $100,000,000, which for years made the Vanderbilt family the most powerful financial influence in America. His bequest of $1,000,000 founded Vanderbilt University, at Nashville, Tenn.

**William Henry Vanderbilt** (1821-1885), son of Cornelius Vanderbilt, was born at Brunswick, N. J. After a course in the Columbia Grammar School, New York, he entered the banking business in that city, but was compelled by failing health to retire to a Staten Island farm. While there he became interested in the Staten Island Railroad, then in grave financial difficulties, and within two years cleared it from debt and connected it with New York by a ferry line. This display of executive ability won him the presidency of the road, and his father offered him the management of various important lines. Upon the father's death in 1877 he became president of the New York Central Railway, and so skilfully managed it that the system ultimately controlled the Michigan Central, the Canada Southern, the Lake Shore & Michigan Southern and the West Shore lines. In his day he was considered one of the greatest authorities on transportation in the world. Like his father, he was interested in education and philanthropy, and gave large sums to Vanderbilt University and other institutions of learning.

**Cornelius Vanderbilt** (1843-1899), son of William Henry Vanderbilt, was born at New Dorp, Staten Island. He was educated by private tutors, and began business life as a bank clerk in New York. After serving for a time in the brokerage house of Kissam Brothers, he entered the employ of the New York & Harlem Railroad, becoming treasurer of that company in 1867. In 1877, when the death of the "Commodore" made Cornelius Vanderbilt's father president of the New York Central lines, the young man became the first vice-president of that road, a position that carried grave responsibilities. Subsequently he held directorships in over thirty different railroad companies. He was a generous contributor to many institutions, including Vanderbilt and Yale universities, and he gave to the Metropolitan Museum one of its chief treasures—Rosa Bonheur's *Horse Fair*.

His eldest son, CORNELIUS (1873- ), is a director in numerous insurance, railway and banking enterprises, and his daughter GLADYS, who married an Austrian count, served as a nurse in Austrian hospitals during the War of the Nations and was awarded the Order of the Red Cross by Emperor Francis Joseph.

**William Kissam Vanderbilt** (1849- ), son of William Henry Vanderbilt, was born on Staten Island. After receiving an excellent education at Geneva, Switzerland, he began business as an ordinary bookkeeper in the treasurer's office of the Hudson River Railway, and after learning thoroughly the details of railroad enterprises was intrusted by his father with the management of numerous responsible offices connected with the New York Central Railway. As a director in no fewer than fourteen railroads and a large number of industries connected with them, he became one of the leaders in American transportation. With his brothers, Frederick William and George Washington Vanderbilt, he founded the Vanderbilt Clinic in New York City, and presented the $250,000 Kissam Hall, in memory of his mother, to Vanderbilt University, Nashville. C.H.H.

**VANDERBILT UNIVERSITY,** a coeducational institution located at Nashville, Tenn., named in honor of Cornelius Vanderbilt (1794-1877), who contributed generously to its endowment fund. Though the original donation of $500,000 was made to a corporation, organized in 1872 under the name of the Central University of the Methodist Episcopal Church, the present institution, which began its sessions in 1875, is a nonsectarian university. The origi-

nal donation of $500,000 was later increased to $1,000,000 by Cornelius Vanderbilt, and the university also received sums from various other members of the Vanderbilt family. In 1913 Andrew Carnegie contributed $1,000,000 to the medical school of the university for endowment and equipment.

The institution is at present organized into the college of arts and sciences and the schools of law, religion, medicine, dentistry, pharmacy and engineering. The main campus, a beautiful expanse of forest trees and blue grass, covers sixty-four acres, and is one of the most attractive in the South. The university has been a strong factor in creating and maintaining high standards of education in the Southern states. It has a faculty of about 150, a student enrolment of over 900 and a library of 60,000 volumes. See VANDERBILT (family).

MAIN BUILDING, VANDERBILT UNIVERSITY

**VAN DYCK,** *dike,* ANTHONIS, or **VANDYKE,** SIR ANTHONY (1599-1641), a celebrated painter of the Flemish school, one of the great masters of portraiture. He delighted especially in depicting cavaliers with their plumed hats and picturesque court costumes, and aristocratic ladies in rich silks and velvets. Often sitters while posing in his studio were entertained by concerts, for Van Dyck was a great lover of music. He was also fond of horses and dogs, and introduced them into his paintings whenever possible. Although he executed a number of religious pictures for churches, one of his favorite subjects being the Entombment, he will always be remembered as one of the world's most refined portrait painters.

Van Dyck was born at Antwerp. His mother was a skilled worker in tapestry, and from her he doubtless learned the art of harmonious coloring and shading. At the age of seventeen her talented son became a pupil of Rubens, and it was not long before the young student was assisting on the works of the great master Following the example of Rubens, he went to Italy to further his studies, spending five years at Genoa, Venice and Rome. In 1627 he returned to Antwerp, where he established his reputation as the fashionable portrait painter of his day. In 1632 Charles I summoned him to England to become his court painter, and soon after his arrival the king knighted him. While in England he painted over 300 portraits, and his sitters included almost every distinguished personage connected with the Court. He also produced several mythological and historical paintings. The year before his death he went to Paris with the view of obtaining a commission to decorate the Louvre, but in this he was disappointed. He lies buried in Saint Paul's Cathedral, London.

VAN DYCK

Van Dyck's portraits are noted for their delicacy and refinement. He frequently used soft, subdued colors, and the lines of his figures are notably graceful and artistic. There are several good examples of his work in American collections, and hundreds of Van Dyck portraits are to be found in the principal galleries of Europe. Those in the Metropolitan Museum include portraits of the Earl of Warwick and the Duke of Lennox, and his celebrated *Portrait of a Lady and Child.* R.D.M.

**VAN DYKE,** HENRY (1852- ), an American essayist, poet, fiction writer, clergyman and educator, born at Germantown, Pa. After thorough courses at Princeton University and the University of Berlin, he became pastor of the United Congregational Church, Newport, R. I., and the Brick Presbyterian Church, New York City. Dr. Van Dyke remained in the ministry until 1900, when he became professor of

English literature at Princeton. In 1908-1909 he served as American lecturer at the University of Paris, and in 1913 President Wilson appointed him minister of the United States to the Netherlands. From this position he returned in 1916 to resume his literary work.

HENRY VAN DYKE
He held the important post of minister from the United States to the Netherlands during the most critical period of the War of the Nations.

As a writer he has covered a wide range of subjects, including fiction, literary criticism, religious works, poetry and essays. His stories are noteworthy for their delicate art, vivid characters and ethical uplift; his verses possess the same qualities, and are among the most popular of twentieth-century American poems.

Dr. Van Dyke, both as a lecturer and as a writer, possesses what Matthew Arnold thought all leaders should have—"sweetness and light"—and his manner is winning because of its appeal to the reason as well as to the emotions. His scholarly though popularly written appreciations of the books of the Bible and other classics are among the best specimens of literary criticism. Most important of his books are *The Poetry of Tennyson, Little Rivers, The Other Wise Man, The Ruling Passion, The Blue Flower, Le Génie de l'Amérique* (delivered as lectures at the University of Paris), *The Poetry of the Psalms, Fisherman's Luck, The Toiling of Felix and Other Poems* and *Grand Canyon and Other Poems.*

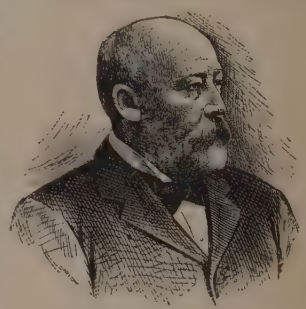
**VAN HISE,** Charles Richard (1857- ), a distinguished American geologist and university president, born at Fulton, Wis. He was graduated from the University of Wisconsin in 1879, since which date he has been continuously associated with that institution, at first as instructor, and later professor of metallurgy, then as professor of geology. In 1903 he was elected president of the university, and at the same time resigned a nonresident professorship at the University of Chicago, which he had held since 1892.

His work has not been entirely in the schools, however, for he has been connected since 1883 with the United States Geological Survey, having been appointed in 1909 geologist in charge of pre-Cambrian and metamorphic geology. Meanwhile he has served in various capacities with the Wisconsin Geological and Natural History Survey and has been a member of several scientific societies. His publications, which are standard in their field, include *Archaean and Algonkian, Principles of North American Pre-Cambrian Geology, Some Principles Controlling the Deposition of Ores, The Conservation of the Natural Resources of the United States* and *Concentration and Control.*

CHARLES R. VAN HISE

President Van Hise had much to do with shaping the policies of the University of Wisconsin which since 1900 have made it one of the most notable institutions of learning in the United States. Particularly effective has been the plan he put into execution to carry extension work to people in all parts of the state who could not attend the university.

**VAN HORNE,** Sir William Cornelius (1843-1915), a Canadian railway official, for many years president of the Canadian Pacific Railway Company. Van Horne was born in the United States, near Joliet, Illinois, and more than half of his active career was spent in that country. He entered the railway service at the age of fourteen, and by the time he was thirty-nine had risen to and left behind the general superintendency of the Chicago & Alton Railroad, the presidency of the Southern Minnesota Railway, and the general superintendency of the Chicago, Milwaukee & Saint Paul Railway. He left the last position in 1882 to become general manager of the Canadian Pacific, whose completion was due in no small measure to his energy and executive ability. From 1884 to 1888 he was vice-president, from 1888 to 1899 president, and



SIR WILLIAM VAN HORNE

from 1899 to 1910 chairman of the board of directors. Van Horne was created a Knight Commander of the Order of Saint Michael and Saint George in 1894.

**VANILLA,** *va nil'a,* a genus of orchids, of commercial value as the source of an extract widely used in flavoring chocolate, ice cream, pastry, confectionery and perfumes. The species producing most of the vanilla of commerce is native to the countries of North and South America, between Mexico and Peru. It is also cultivated extensively in Java, Ceylon, the West Indies and other warm regions, and is propagated by cuttings. The plant has a long stem and aërial rootlets, and is enabled to attach itself to trees by the latter. It lives for nearly half a century and produces its first crop at the end of three years, if normal conditions have prevailed.

VANILLA
Flowering branch and pod.

The fruit is a cylindrical pod, or "bean," seven or eight inches long, with an oily black pulp containing large numbers of tiny black seeds. The pods are gathered before they are ripe, are slowly dried and then sweated, or fermented, the latter process serving to develop the flavor and aroma. Vanilla extract is prepared from the pulp of the beans by a laborious process. The best beans sometimes sell for as high as $15 a pound, therefore substitutes and adulteration of vanilla are common. Vanillin, the aromatic principle of the fruit, is produced by artificial methods and used in the preparation of cheaper grades, and the extract of the tonka bean is frequently marketed as a cheap substitute.

**VAN RENSSELAER,** *ren'se ler,* Stephen (1764-1839), an American statesman, the last of the Dutch patroons, whose former estate near Albany now constitutes three counties. He was born in New York City and was educated at Harvard. Having become interested in politics, he was elected to the legislature in 1789, was state senator from 1790 to 1795, lieutenant-governor from 1795 to 1801, and presided over the state constitutional convention in 1801. Van Rensselaer was a prominent member of the commission that effected the construction of the Erie and Champlain canals, and he directed and financed a geological survey of New York in 1821-1823. In 1824 he established at Troy, N. Y., a scientific school for the instruction of teachers, which was incorporated in 1826 as the Rensselaer Polytechnic Institute. Between 1823 and 1829 he was a member of Congress. See Patroon System.

**VAPOR,** *va'per.* In physics this term is applied to the gaseous state into which solids and liquids pass when heated. In a technical sense both steam and oxygen are vapors. It is customary, however, to make this distinction between gases and vapors: the former retain the form of air at ordinary temperatures, and the latter resume their liquid or solid state under the same conditions. The process of converting a substance into a vapor is called *vaporization. Evaporation* and *boiling* are forms of vaporization; in the one case the change to a vaporous condition takes place slowly and quietly, and in the other very rapidly. When the boiling point of a solid is lower than the melting point and it vaporizes without first becoming a liquid, it is said to undergo *sublimation.* Vaporization in connection with atmospheric conditions bears a very important relation to climate. Water vapor is constantly present in the air, and under varying conditions it forms clouds, dew, rain and snow.

**Related Subjects.** In connection with this article on vapor, the reader may consult the following topics in these volumes:

| | |
|---|---|
| Boiling Point | Rain |
| Cloud | Snow |
| Dew | Steam |
| Distillation | Sublimation |
| Evaporation | |

**VARICOSE VEINS,** *var'i kohs vanes',* veins that have become dilated through some condition which interferes with the flow of venous blood back to the heart. Veins in the legs are commonly affected, especially in cases where the occupation necessitates much standing. Other predisposing causes are diseases of the heart and liver, gout, overindulgence in athletic sports and the wearing of tight garters. In advanced cases knotty lumps of a bluish color form along the vein, and the victim experiences considerable pain in the affected limb. The chief danger arises from the bursting of

the vein, which may cause hemorrhage. Physicians recommend the use of an elastic stocking, or bandage, which gives support to the vein by means of uniform pressure. A badly affected limb should be given complete rest until there is relief. The only positive cure is a minor operation consisting of the cutting out of sections of the enlarged vein. C.B.B.

**VARIETY,** *va ri' e ti,* a term used in botany and zoölogy classifications. A variety is a division of a species, and includes an individual or group of individuals which show certain differences from the rest of the species to which they belong. See CLASSIFICATION, subhead *Variety.*

**VAR'NISH,** a clear, liquid preparation which hardens when exposed to the air. It is used to preserve various surfaces from the influence of the air and moisture and to beautify such surfaces. It consists of a solution of resinous gums in alcohol, turpentine or linseed oil, and imparts a thin, transparent gloss to wood, metals, paint, paper, leather and other substances. The resinous substances commonly used are copal, lac, mastic, sandarac, amber and asphalt. The principal coloring matters employed are dragon's blood, saffron, gamboge, cochineal, tumeric and coal-tar dyes.

Varnishes are divided into three classes, according to the solvents used. Those in which the gums are dissolved in alcohol are called *spirit varnishes.* They consist chiefly of a solution of lac and are made in revolving churns. They dry rapidly, leaving a very hard and brilliant coat which cracks and scales if exposed to the weather, and are used chiefly for cabinet work, gilding and metal work. *Turpentine varnishes* are brighter and less brittle. The principal solvent is turpentine, though linseed oil is frequently added to increase the tenacity. These varnishes are used for oil paintings.

In *oil varnishes* the solvents are linseed, poppy or walnut oil, and the basis is copal, a fossil gum found in Zanzibar, New Zealand, Sierra Leone and the Philippine Islands. In varnishes of the best grade only Calcutta linseed oil and the white, transparent pieces of copal are used. To hasten the drying process the oil is boiled or combined with more volatile substances. The gum is melted in copper vessels and simultaneously the oil is heated to the boiling point. A certain proportion of the boiling oil is added to the liquid copal and the mixture is boiled until it becomes clear. There is great risk of burning, and the kettles are usually placed on truck wheels so they may be quickly removed from the fire. By alternate addition of oil and copal, the mixture is brought to the proper consistency. It is then allowed to cool, and oil of turpentine is added. The varnish is strained through cotton and pumped into tanks, where it is left to age for at least six months.

The black, opaque varnish known as *japan* is a solution of asphaltum, and in Japan is made from the resin of the lacquer tree. C.H.H.

Consult Hurst's *Painters' Colors, Oils and Varnishes;* Holley's *Analysis of Paint and Varnish Products.*

**VASCO DA GAMA.** See GAMA, VASCO DA.

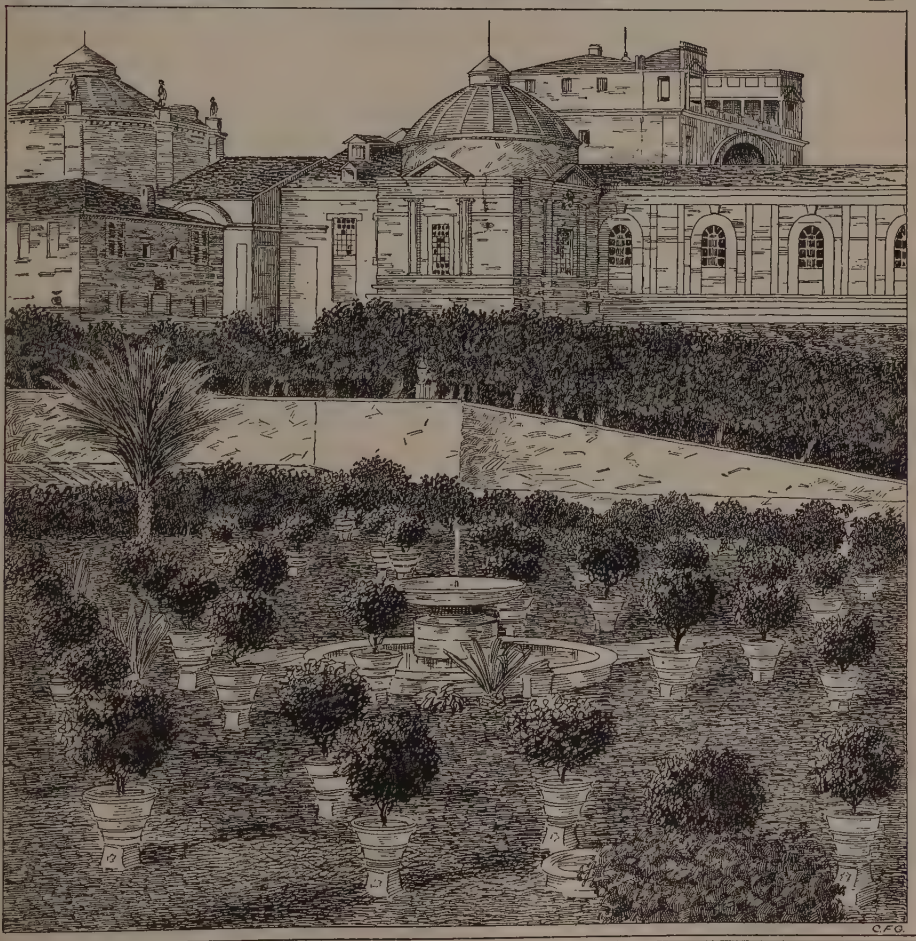
**VASE,** a hollow vessel of pottery, stone, metal or glass, used chiefly as an ornament. Information relating to vases will be found in the articles POTTERY, DRESDEN CHINA, MAJOLICA and ETRUSCAN ART.

**VASELINE,** *vas' e lin,* or *vas' e leen,* a trade name for a soft, amber-colored grease used extensively as an ointment. It is a preparation of petrolatum, or the residue from the distillation of petroleum. Vaseline is insoluble in water, but can be slightly dissolved in alcohol and completely in ether. It has the advantage of never becoming rancid, and is a popular external remedy for burns, raw sores, sunburn, skin irritations and the like. As an internal remedy it is valued in the treatment of coughs, hoarseness and throat irritation. Other preparations of petrolatum are marketed under various names, such as *petroleum jelly* and *cosmoline.* C.B.B.

**VASSAR COLLEGE,** *vas' ahr kol' ej,* near Poughkeepsie, N. Y., is one of the foremost American colleges for women. It was founded in 1861 through the generosity of Matthew Vassar, who donated 200 acres of land and nearly $800,000 for the founding of a college for women. Vassar was the first school of its kind in America to be incorporated as a college and fully equipped to do college work. The highest standards are maintained. All undergraduate courses lead to the degree of A. B., and for

TAYLOR HALL
One of Vassar's newest buildings, completed in 1915.

# TWO VIEWS OF VATICAN AND GARDENS



graduate work the degree of A. M. is conferred. Courses are largely elective, with the exception of certain requirements in Latin and the Romance languages, literature, mathematics, science and history.

Vassar is notable not only for high academic standards but also for the interest taken by its faculty and students in social and humanitarian problems. There are no Greek-letter societies except that of Phi Beta Kappa (see page 4619). The regulations concerning student activities are directed by the student government association. The undergraduates and alumnae have built and endowed a clubhouse for the use of the women employees of the college. In Tokyo, Japan, there is a dwelling house for native women and students built and maintained by the Christian Association of Vassar, which includes nearly all of the students.

The beautiful campus is on a hill overlooking the Hudson, and many of the fine buildings are gifts of alumnae and trustees. The Thompson Memorial Library, containing 9,000 volumes, was the gift of Mrs. Frederick Ferris Thompson, whose husband was for many years a trustee of the college. The chapel was the gift of Mrs. Mary T. Thompson and Mrs. Mary M. Pratt, two alumnae. Taylor Hall, named in honor of former president James M. Taylor, was dedicated as an art building in 1915. Vassar has a faculty of about 138, and the average student registration is 1,100.

**Matthew Vassar** (1792-1868), the founder of the college, was born in England. He was brought to America at the age of four and spent his early boyhood on a farm near Poughkeepsie. He made his fortune in the brewing business, and was a generous contributor to various charities, though he is remembered chiefly for his gift for the higher education of women. M.W.

Consult Taylor and Haight's *Vassar;* Norris's *The Golden Age of Vassar.*

**VATICAN,** *vat'i kan,* the great palace in Rome which contains the residence of the Pope, and in addition, a valuable library, an extensive art collection and museums of various kinds. It is located in the northwestern part of the city. The long, irregular structure, which to-day covers about thirteen and one-half acres, including the open courts, is not the work of any one period. It was begun in the twelfth century, and was enlarged and adorned by many Popes in the succeeding centuries, but not until after the return from Avignon, late in the fourteenth century, did it become the official Papal residence. About the open courts, which cover in all six acres, are gathered chapels, offices, dwelling apartments, museums and chambers of other kinds, the portion occupied by the Pope being in the southeastern part of the structure. Church councils are held in the Vatican, and the election of Popes takes place in the Sistine Chapel, the most beautiful room, which contains the superb frescoes of Michelangelo. Examples of the work of Raphael are found in the frescoes of the papal reception rooms, and works by Da Vinci, Titian and other masters adorn the walls. Such well-known statues as the *Apollo Belvedere* and the *Laocoön* are contained in the museum.

The great library of the Vatican dates in its beginnings from the middle of the fifteenth century, from the time of Pope Nicholas V. There are contained in it over 200,000 printed volumes, but by far the most important part is the collection of manuscripts, of which there are about 26,000. Some of these, such as the manuscript of the Bible known as the *Codex Vaticanus,* which dates from the fourth century, two *Vergils,* from the fourth and fifth centuries and a *De Republica* of Cicero are almost invaluable. In the library are included also the Papal archives, the records of the Papal court for a thousand years.

Since the unification of Italy and the consequent loss to the Papacy of all temporal power, the Pope has lived wholly within the Vatican, never going beyond its gardens. See POPE; ROMAN CATHOLIC CHURCH; also, page 6039.

Consult Sladen's *How to See the Vatican;* Venturi's *The Vatican Gallery.*

**VAT'ICAN COUN'CIL,** the name given to a general council of the Roman Catholic Church, the first one to be held since the Council of Trent, three centuries before. It was called by Pope Pius IX in 1868, and its sessions, which were held in the Vatican, lasted from December, 1869, until July, 1870. This council reaffirmed the fundamental doctrines of the Church and also ratified and defined the doctrine of the spiritual infallibility of the Pope.

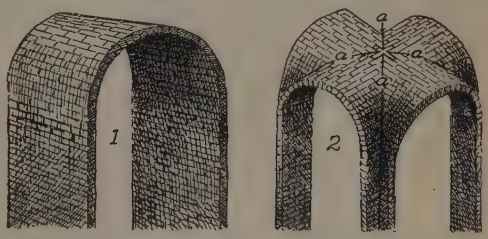
**VAUDEVILLE,** *vohd'vil,* a term now generally applied to a performance of music, singing, dancing or entertainment of any other kind given in a series of short "acts," each independent of all other acts. The term first originated in France and was applied to drinking songs, humorous and satirical, that were composed by a man living in Vire in the Vaux de Vire, two valleys of Normandy.

The vaudeville first introduced into stage performances was as an adjunct to the drama and consisted of music and dancing in the intervals of the play. Now, however, vaudeville has taken a position of its own and is regarded almost as a different profession from that of the "legitimate" stage. So great has been the popularity of vaudeville in recent years that the most prominent actors and actresses of both hemispheres have appeared in vaudeville. The remuneration is usually in excess of that of most members of the dramatic profession.

**VAUDREUIL-CAVAGNAL,** *vo druh'y' ka va nyal'*, Pierre François, Marquis de (1698-1765), a French soldier and colonial official, the last governor of New France. His father Philippe (1641-1725) was a French soldier, who served under Frontenac and later was governor-general of New France. The son was born at Quebec, and at an early age entered the army. In 1733 he was appointed governor of Three Rivers and in 1742 governor of Louisiana; in 1755 he succeeded Duquesne as governor-general of New France. Between him and Montcalm there was little good feeling, and it was charged that Vaudreuil might have kept Wolfe's army from holding Quebec in 1759 if he had been willing to take any decisive steps, but he neglected his chances. In 1760 he surrendered Montreal to the English, although General Levis, the military commander, wanted to defend it. Vaudreuil's mistakes led to a trial in Paris, but he received vindication. His son, Louis Philippe (1724-1802), a French naval officer, took part in many battles and participated in the siege of Yorktown in 1782.

**VAUGHAN,** *vawn*, Herbert (1832-1903), an English cardinal of the Roman Catholic Church, who succeeded Cardinal Manning as archbishop of Westminster. He was born at Gloucester and educated at Stonyhurst College and on the Continent. In 1854 he was ordained a priest and joined the Oblates of Saint Charles, of which Cardinal Manning was the head. Interested alike in education and in missionary enterprise, he founded, at Mill Hill, near London, Saint Joseph's College for foreign missions, and in 1871 visited the United States to investigate the work of the Church among the negroes. In the next year he was made bishop of Salford, and in 1892 succeeded Manning as archbishop. His elevation to the cardinate occurred in 1893. Cardinal Vaughan was an earnest exponent of the ultramontane view, refusing to recognize the right of other Churches to be considered a part of the true Church.

**VAULT,** *vawlt*, in architecture, a roof or ceiling in the form of an arch. There are four principal varieties: the *barrel* vault, the *dome*, the *groin* vault and the *ribbed* (Gothic) vault. The simplest form is the barrel vault (see *1* in illustration). It is a continuous arch, so built that all parts are held in place by themselves, supporting each other. The dome developed from the barrel vault, and was at first a hemisphere built upon a circular base (see Dome and pictures, page 1835). The groin vault is formed by the intersection of two or more barrel vaults, as shown in *2* of the illustration. The lines of intersection, (*a*) are called *groins*. In ribbed vaulting arched ribs are built in the places that otherwise would be occupied by groins. The ribs rest on pillars and make massive walls unnecessary. In Gothic architecture such ribs were employed both for structural and for decorative purposes. See Architecture.




BARREL AND GROIN VAULTS
Explanation appears in the text.

**VEDAS,** *va'dahz*, a term derived from a Sanskrit word meaning *to know*, and used to designate the oldest sacred writings of India. These works are written in Sanskrit and are supposed to have been produced between 1500 and 1000 B.C. A succession of authors, generation after generation, added to them, so that they represent the progressive religious thought of centuries, the earliest being by far the simplest. The Vedas are divided into four parts, *Rig-Veda, Yajur-Veda, Sama-Veda* and *Atharva-Veda*, of which the *Rig-Veda* is the oldest and most important, as well as the stateliest in form.

The original name for the *Rig-Veda* meant *stanzas of praise*, and that is what the collection really contains. These stanzas, or hymns, are in praise of the gods, who are in reality personifications of the elements, and they are intended to be used during sacrifice. The other three Vedas seem to have been drawn largely from this first one. The *Yajur-Veda* lays greater stress on sacrifice as a rite than it does on the deities to whom the sacrifice is ad-

dressed. Every sacrificial act and vessel has its own blessing. The *Sama-Veda* contains largely the same hymns as the *Rig-Veda*, set to melodies for chanting, while the last of the four, which is undoubtedly the latest, contains not only blessings, but curses, and charms to use against witchcraft and magic. Since this last of the Vedas concerns itself with superstition rather than with religion, it is by some scholars not classed as a Veda at all.

Prose treatises, entitled *Brahmanas*, accompany and explain each of the Vedas, in particular describing the sacrificial rites in connection with which the hymns were to be used.

**VEGA CARPIO,** *va'gah kahr'pyo,* LOPE FELIX DE (1562-1635), commonly called LOPE DE VEGA, a Spanish dramatist and poet, founder of the Spanish theater, was born and educated at Madrid. He did advanced work at the University of Alcalá de Henares, Spain, and while yet a student began a marvelous career as a writer of plays. In 1588 he served with the "Invincible Armada" and during the same year gained considerable notoriety by eloping with the daughter of Phillip II's herald. After the death of this woman and of a second wife, he became a priest about 1612 and passed his days thereafter in self-imposed privation and penance. He had led a rather loose life, and in his old age felt keenly the stings of remorse.

As a poet and playwright, he had no equal in his day in Spain; he influenced every literary movement in that country during his time; he associated with the nobility on terms of perfect equality; the common people idolized him. Pope Urban VIII made him a Knight of Malta, gave him the degree of Doctor of Theology and presented him with the golden cross of the Order of Saint John of Jerusalem.

In all literature there has not been his superior in prolific imagination. He wrote about eighteen hundred comedies, four hundred short religious pieces for the stage, a number of interludes or brief dialogues, several prose romances, a great number of lyrics and three epics. For many years there was scarcely a week when he did not produce a play, and he himself declared that in more than a hundred instances he wrote, rehearsed and produced a play in twenty-four hours. About four hundred of his works have been published, and in 1893 the Spanish Academy began the collection and publication of his writings. Among his best ones are *Punishment without Vengeance, The Star of Seville, The Sword of Madrid, The Captives of Argel* and *Strife unto Death.* In both comedy and tragedy he presented ideas and characters that influenced the stage of Europe for more than two centuries.

**VEGETABLE IVORY.** See IVORY PALM; BUTTON.

**VEGETABLES,** *vej'e ta b'lz.* In the usual sense the word *vegetables* is applied to those plants whose leaves, stalks, roots or tubers are used for food, such as lettuce, asparagus, cabbage, beets and turnips. Raising vegetables for market constitutes the branch of horticulture generally known as "truck farming." The important vegetables are described in these volumes under their respective titles, and the best methods of cultivation are discussed in the article GARDENING (which see). This article is devoted to the discussion of vegetables as articles of food.

Animal foods, such as meat, eggs, butter and cheese, are rich in protein and fats, but they contain only a small proportion of carbohydrates (see FOOD). What these foods lack vegetable foods supply. Omitting the grains, we find that most of the vegetables contain a large proportion of water, ranging from ninety-five parts in the cucumber to eight and one-half parts in dried lentils, and nine parts in dried peas. With the exception of beans, lentils and peas, vegetables contain less nutriment than animal foods. As a rule, however, they are less difficult to digest, and some of them contain juices and acids highly beneficial to the system. Beans, peas and lentils are rich in protein and are among the most nutritious foods. Ground into meal they form the chief ingredient of soup tablets, and the rations prepared for armies in the field. The best diet consists of a variety consisting of animal and vegetable foods. Vegetables should be eaten with meats, milk, butter and cheese.

The proportion of vegetables in one's diet usually varies with the climate and the season. The natives of the polar regions live almost entirely upon animal food, while the inhabitants of the tropics eat but little meat. In the temperate regions more vegetables are eaten in summer than in winter. One of the objections raised to an exclusively vegetable diet is that it requires too much food to secure the necessary supply of nutriment, so that the digestive organs are taxed beyond their capacity (see VEGETARIANISM).

About fifty different vegetables are found in the markets of the United States and Canada, and about fifteen are in daily use by the average American family. It is not necessary for

# VEGETABLES GRANDMOTHER DID NOT KNOW

## When a Girl

Yam

Tomato

Okra

Swiss chard

Endive

Brussels sprouts

Artichoke

Solanum

Egg-plant

Rhubarb

| GARDEN CROPS | JAN. | FEB. | MAR. | APR. | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | NOV. | DEC. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Artichoke, American | | | | * | * | | | | | | | |
| Asparagus | | | 5 | * | | | | | | | | |
| Beans, bush | 6 | 6 | 6 | * | 2 | 2 | 2 | * | | | | |
| Beans, pole and lima | | | | | * | * | | | | | | |
| Beets | | | 4 | 4 | * | * | * | * | | | | |
| Brussels sprouts | | | | | 1 | 1 | | | | | | |
| Cabbage, all sorts | | 4 | 4 | 1 | 1 | 1 | | | 7 | 7 | | |
| Carrot | 6 | 6 | 5 | * | * | * | * | | | | | |
| Cauliflower | 6 | 4 | 4 | 1 | 1 | 1 | | | | | | |
| Celery | | 4 | 4 | 1 | 1 | 1 | | | | | | |
| Chicory | | | 5 | * | * | * | | | | | | |
| Corn, field | | | | * | * | * | | | | | | |
| Corn, sweet | | | | 2 | 2 | 2 | 2 | * | | | | |
| Corn, pop | | | | * | * | * | | | | | | |
| Cress | 12 | 12 | 12 | 12 | * | * | | | 12 | 12 | 12 | 12 |
| Cucumber | 6 | 6 | 6 | 4 | * | * | | 6 | 6 | | | |
| Eggplant | | 6 | 4 | 1 | 1 | 1 | | | | | | |
| Endive | | | | 1 | 1 | 1 | 1 | | | | | |
| Kohl-rabi | 6 | 6 | 4 | 1 | 1 | 1 | 1 | | | | | |
| Leek | | 4 | 4 | 1 | 1 | 1 | | | | | | |
| Lettuce | 6 | 4 | 4 | 1 | 2 | 2 | 2 | * | 9 | 9 | 7 | |
| Melon | 6 | 6 | 6 | 4 | * | * | 9 | 6 | | | | |
| Mushroom | 10 | 10 | 11 | | | | | 11 | 10 | 10 | 10 | 10 |
| Mustard | 12 | 12 | 12 | * | * | * | | * | * | 12 | 12 | 12 |
| Okra | | | 4 | 4 | 2 | 2 | 2 | | | | | |
| Onion | | 4 | 4 | 1 | 1 | | | | | | | |
| Oyster Plant | | | 5 | | | | | | | | | |
| Parsley | 6 | 6 | 4 | * | * | * | * | | | | | |
| Parsnips | | | 5 | * | * | * | | | | | | |
| Peas | | | 5 | 2 | 2 | 2 | 2 | * | | * | | |
| Pepper | | 4 | 4 | 4 | 1 | | | | | | | |
| Potatoes | | | | * | * | | | | | | | |
| Pumpkin | | | | 4 | * | * | | | | | | |
| Radish | 12 | 12 | 12 | 3 | 3 | 3 | | | 9 | 9 | | |
| Spinach | | | 5 | * | * | | | | 2 | 8 | | |
| Squash | | | 4 | 4 | * | * | | | | | | |
| Tomato | 6 | 6 | 4 | 1 | 1 | 1 | | 6 | 6 | 6 | | |
| Turnips | | | | | | | | * | * | | | |

EXPLANATION OF SIGNS USED IN THE TABLE

* To be sown in open ground without transplanting. It is necessary to thin out the plants to secure the proper distance between them.

1. Sow in the garden seed bed and transplant to a permanent location.
2. Two sowings in the open ground during the month should be made.
3. Three sowings in the open ground during the month should be made.
4. Start the plants in a greenhouse or hotbed, planting them in the ground as soon as it is in good condition and the weather is favorable.
5. Sow in the open ground as soon as it can be worked.
6. Plants should be grown in a hotbed or greenhouse.
7. Sow in cold frame; the plants should be kept there over winter with a little protection and be planted out in the spring as soon as the ground can be worked.
8. Sow in the open ground and protect with litter over winter.
9. Plant in frame, and when cold weather begins cover with sash and straw mats. Plants will be ready for use in December and January.
10. Plant in barn, cellar or beneath the benches in a greenhouse.
11. Plant out-of-doors in prepared beds.
12. In order to have a succession of crops sow every week in a greenhouse or frame.

N. B. For the last planting of beans, sweet corn, kohl-rabi, peas and radishes, or even tomatoes, take the earliest varieties, the same as are used in the first planting.

The last sowings of vegetable oyster are intended to remain undisturbed over winter. Roots from these sowings will, the next year, attain a size double that usually seen

one to purchase the most expensive vegetables in order to secure the necessary variety in one's diet. The man of limited means who purchases the staple vegetables in their season fares equally well with the man whose income leads him to purchase the so-called delicacies, which are merely fruits and vegetables grown in hot-houses and placed on the market out of season.

**Planting Time for Vegetables.** The table on the preceding page is recommended to those interested in growing vegetables in the home garden.

Consult *Bulletins* of the United States Department of Agriculture, as follows: *Bulletin 28,* "Composition of American Food Materials;" *Bulletin 121,* "Beans, Peas and Other Legumes as Food."

**Related Subjects.** The vegetables listed in the planting table above are all described in these volumes, as are also the following additional ones:

| | |
|---|---|
| Chard | Solanum |
| Lentil | Sweet Potato |
| Melon | Yam |
| Rhubarb | |

**VEGETARIANISM,** *vej e ta'ri an iz'm,* the theory and practice of living upon a vegetable diet, excluding fish, flesh and fowl. The term came into use about the year 1847, but the doctrine is centuries old, having been advocated by Pythagoras, Plato and Plutarch, and in later times by Rousseau, Shelley and Swedenborg. The records of these men, apart from the above phase, appear in their order in these volumes.

At the present time vegetarian societies in considerable numbers are maintained in the United States, Canada, Great Britain, Germany, France, Austria, Holland and Australia, while the principles are further emphasized by means of lectures, cooking demonstrations, literature and "pure-food" restaurants. The Vegetarian Federal Union, founded in America in 1889, has branches throughout the world.

There are various schools within the general vegetarian group. For instance, some would exclude not only meat of every kind, but such animal products as milk, eggs and cheese. Others maintain that cooked foods have no place in the ideal diet, and that only fruits, nuts and grains in their natural state should be eaten. Others use only fruits and vegetables grown above ground, and some exclude all grain and pulse foods. The majority of vegetarians, however, simply reject the use of flesh, fowl and fish.

**Basis for Belief in a Vegetable Diet.** The chief arguments on which the vegetarians base their practice are as follows:

(1) A vegetable diet is more healthful than a meat diet because animals suffer from diseases and parasites which they may communicate to any person eating their flesh.

(2) Animal flesh is expensive. A given amount of nutriment can be obtained from eating fruit, grain and nuts at a less cost than the same nutriment obtained from meat.

(3) Vegetarianism favors social as well as individual economy, because a given area of land devoted to the cultivation of fruits and vegetables will produce much more food than if used for feeding cattle.

(4) The general adoption of a vegetable diet would result in race improvement, because it would necessitate in each community a larger proportion of people devoted to agriculture and horticulture.

(5) Vegetarianism tends to develop the higher nature of man. The flesh eater indirectly sanctions the cruel and systematic slaughter of helpless animals, the psychological effect of this being the development of a callous and fierce nature, at the expense of gentleness and sympathy.

(6) Man is not a flesh eater, from the standpoint of physiology. His teeth are not adapted to chewing meat, and his intestine is longer than that of the flesh-eating animals

(7) Finally, all the nutriment necessary for the upkeep of bodily and mental health is found in fruits and vegetables.

**The Other Side.** The opponents of vegetarianism argue that the structure of the digestive system of man and the variety of intestinal juices show that nature intended him to live on a mixed diet, deriving nutriment from all kinds of food. Further, that experience has proven that a prolonged period of living on vegetable foods results in a weakening of the power to resist diseases. Animal food has the advantage of satisfying hunger sooner than vegetable food because it remains longer in the stomach, vegetable food being digested chiefly in the intestine. Animal food is also the more stimulating.

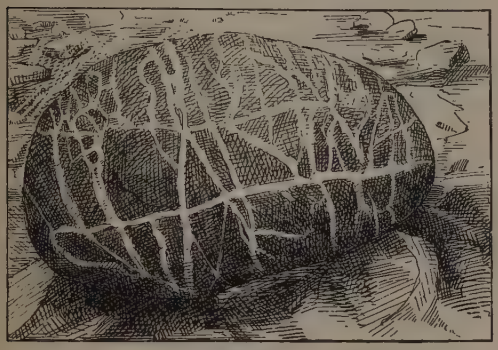
**The Middle Ground.** The weight of scientific opinion at the present time appears to favor a mixed diet, but the tendency is to reduce the amount of meat eaten. It is generally agreed that in the past meat has had too prominent a place in the diet of the average person. The vegetarians have helped to throw light on the important subject of what a man shall eat, and the saner views now held in regard to the food subject may to some extent be credited to them. B.M.W.

Those interested in the theory of the vegetable diet will find the following books helpful: Kingford's *The Perfect Way in Diet;* Williams' *The Ethics of Diet;* Newman's *Essays on Diet;* Salt's *A Plea for Vegetarianism;* Hill's *Essay on Vegetarianism.*

**VEGREVILLE,** *ve'gur vil,* a town in the east-central part of Alberta, on the main line of the Canadian Northern Railway, seventy-three miles east of Edmonton. It is also the terminus of the Calgary-Vegreville branch of the Canadian Northern, a line 259 miles long. The character of the surrounding district is reflected

by Vegreville's chief business and industrial establishments, which are grain elevators, brick and terra cotta works, a creamery, flour mill, marble and granite works, two stockyards, and several farm-implement warehouses. Several parks, the exhibition hall and several schools are attractive features of the town. Population in 1911, 1,029; in 1916, estimated, 2,000.

**VEIN,** *vane.* It is not uncommon to find pebbles and boulders having seams of rock of a different kind running through them in all directions. The rock filling these seams forms veins; it is usually harder than the surrounding



VEINS

rock and forms ridges on the surface. Veins are usually formed by molten rock which is forced into the crevice by pressure. But they may be formed by water containing the mineral in solution, as sometimes occurs in caves where the water charged with lime or silica in solution in course of time fills a crevice by depositing its material as it evaporates, the same as in the formation of stalactites (see STALACTITES AND STALAGMITES). Large veins often contain metals; they are then called *lodes.*

**VEINS,** *vanes.* Blood is circulated through the body through a system of tubes or blood vessels, of which there are three kinds—capillaries, arteries and veins. The special purpose of the veins is to carry back to the heart the blood which has given out nourishment to the tissues and taken up worn-out and poisonous matter. This venous, or blue, blood circulates through the heart and then is sent to the lungs to be recharged and purified, after which it begins again its journey through the body. The details of the circulatory system are told in the article CIRCULATION OF THE BLOOD, accompanying which is a colored picture showing all the principal veins.

The veins begin at the capillaries. They are minute at first, but as they proceed from the capillaries they unite to form larger veins, and this is repeated until all unite to form two large vessels. One of these, the *descending vena cava,* carries blood from the head and arms to the heart; the other, the *ascending vena cava,* conducts it from the trunk and lower limbs. The veins, like the arteries, have walls composed of three coats, but those of the veins are thinner and less elastic than those of the arteries. The blood current flows through the veins more slowly than through the arteries and without pulsation. A distinguishing feature of most veins is their possession of many valves, formed by pouches in their inner coat. The purpose of these valves is to keep the blood flowing toward the heart. When the current is flowing onward they lie against the walls, but if the flow is obstructed, the valves automatically close and bar the backward passage of the fluid. Valves are most numerous in the veins of the extremities, and they are lacking in the smallest veins and in those of the abdomen brains and lungs. Some veins may be clearly seen through the skin. C.B.B.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Arteries | Capillaries |
| Bleeding | Circulation of the Blood |

**VELASQUEZ,** or **VELAZQUEZ,** *va lahs' kayth,* DIEGO RODRIGUEZ DE SILVA Y (1599-1660), the greatest master of Spanish painting, and one of the foremost of all ages. In the city of Seville, his birthplace, he received his early art instruction under excellent teachers. Velasquez went to Madrid in 1622, where he presently won the favor of King Philip IV. The latter made him court painter, conferred on him a pension and a studio, and for the next thirty-six years was his faithful friend. Velasquez painted numerous portraits of the king and other members of the royal family, as well as the lords and ladies of the court. He delighted especially in portraying the royal children and the dwarfs and jesters whom the king gathered about him for amusement in periods of depression.

VELASQUEZ
The world has produced few, if any, greater painters.

Feeling the need of further study, especially a better acquaintance with the Italian masters, Velasquez succeeded in 1629 in winning the king's consent to a journey to Italy. In Venice, Rome and Naples he studied the works of great masters to good purpose, and returned to Spain in 1631 with a deeper knowledge of his art and with ripened powers. The chief events of his later career were a second visit to Italy and his appointment as marshal of the royal palace in Madrid. In 1659, the year before his death, he received the highest honor the king could confer on a Spanish nobleman —the cross of Santiago. It is said that the king made known this honor by painting a red cross on the breast of a figure of the artist.

Velasquez was a supreme naturalist. He did not paint what his imagination conceived for him, but pictured exactly what he saw, and he combined this power of realism with a mastery of technique. He was a master of light and shadow, of coloring and of composition—a true "painter's painter." His rich powers are best revealed in the magnificent collection of his paintings in the gallery of the Prado, Madrid. Among the characteristic works in this collection are the *Forge of Vulcan; The Stag Hunt,* showing his skill in painting dogs; the *Surrender of Breda,* his most celebrated historical painting, and a *Crucifixion.* The National Gallery of London and other European galleries contain examples of his work, and he is also represented in the Metropolitan Museum in New York, which possesses a *Christ and the Pilgrims of Emmaus,* and portraits of Philip IV and the Infanta Maria Theresa. Various other canvases may be seen in private American collections. R.D.M.

Consult Hinds' *Days with Velasquez;* Stokes' *Velazquez and His Works.*

**VELOCIPEDE,** *ve lahs' i peed.* See BICYCLE.

**VELOCITY,** *ve lahs' i ti,* a term used in physics to express the rate at which bodies change position in space. Kinetic energy (that is, energy in actual operation) is measured by mass and velocity, and when the mass of a moving body is multiplied by its velocity, or speed, the result is its momentum. Velocity is expressed as so many miles per hour, so many feet per second, etc. It is said to be *uniform* when the spaces traversed in given units of time are equal, and *variable* when these spaces are unequal; it is *accelerated* when, during each portion of time, it passes through a greater space than during the preceding equal portion, as in a falling body; it is *retarded* when a smaller space is traversed in each successive unit of time, as in a body rising into the air. See FALLING BODIES; ENERGY.

**VEL'VET,** a fabric woven of silk, covered with a close, fine and soft nap on one side, the other side being a strong, close tissue without nap. The nap is formed by part of the threads of the warp which the workman puts over wires on the surface; a knife is passed along a groove in each of the wires, which are then withdrawn. A kind of velvet called *velveteen* is made in a similar manner, from a mixture of silk and cotton. Plush is made in the same way.

Florence and Genoa were long noted for the beauty of the velvet they produced, but the modern center of the velvet industry is at Lyons, France. Many choice examples of ancient velvet are preserved in collections. There has been within recent years a great revival of the popularity of velvet for women's costumes, and it is now made in a wide variety of shades and colors, ranging in price from $1.50 per yard up to several dollars. Practically the entire output of the United States, worth about $5,000,000 a year, is made in Connecticut.

**VENATION,** *ve na' shun,* the arrangement of veins in leaves. The veins are a part of the framework which supports the cellular tissue, and their arrangement is related to the shape of the leaf and its mode of germination. There are three principal plans of arrangement—in *network,* in *parallel* lines, and in *branching,* or *forked,* lines.

The netted-veined leaves exhibit the greatest variety, and are divided into several groups. Those having a single midrib, from which there are branching primary veins terminating in delicate veinlets curving upward just within the margin of the leaf, as in the lilac, are called *true-netted* leaves. When the primary veins from the midrib extend directly to the edge of the leaf, as in the elm, oak and chestnut, the leaves are said to be *feather-veined.* In another group of netted leaves the primary veins start with the midrib from the base of the leaf instead of branching off at intervals along its length. In still others there are several midribs extending from the base to the points of the leaf, as in the maple and castor leaves.

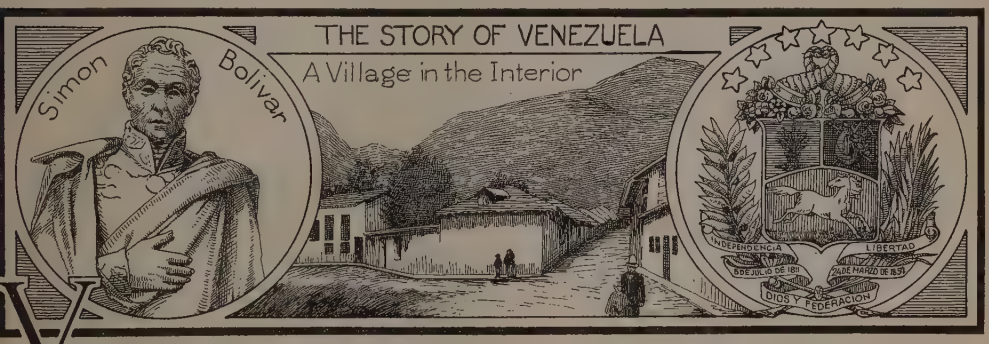
Long, slender, straight-edged leaves are usually parallel-veined. The ribs may extend lengthwise from the base to the tip of the leaf, as in the lily, or in more or less divergent parallel lines, as in the palm, or may extend transversely across the leaf from a midrib, as in the canna leaf.

*Forked veining* is found in the feathery ronds of ferns. In a few thick, fleshy leaves ike the stonecrop, the veins are obscure, and uch leaves are said to be *hidden-veined.* Moss eaves, which have no branching ribs, are called *einless.*

For illustrations of netted and parallel veinngs, see pages 3361 and 3362, in the article LEAVES.

**VENDETTA,** *ven det' a,* the Italian name for form of private warfare having for its object he avenging of an injury. It is found in its nost relentless form in Corsica. Vendetta is practically the same as the *feud* of the mounaineers of Kentucky and Tennessee. Accordng to the code of those who practice such warare, when a person is slain his nearest kinsmen become responsible for the avenging of his death; if the guilty person escapes, punishment s meted out to his nearest relatives. Feuds are sometimes handed down from one generation to another, and they lead to atrocious crimes. Such practices flourish only in communities removed from the power of the law, and are gradually disappearing almost everywhere. See BLOOD, AVENGER OF.

**VENEER,** *ve neer',* a thin sheet of wood, pearl, ivory or other material glued on the surface of various woods to give a more artistic finish. The woods are usually mahogany, rosewood or maple, and the veneer may be nearly as thin as paper. After gluing, the wood is pressed, the superfluous glue is wiped off, and the surface is polished. There is a popular prejudice against veneered furniture, probably arising from the defects of cheap or careless work, but, as a matter of fact, a well-manufactured article of veneered furniture is as good looking, as enduring, and often stronger than a similar piece of solid wood.




**VENEZUELA,** *ven e zwe' la,* in Spanish, *va na swa' lah,* officially known as the UNITED STATES OF VENEZUELA, is a Federal republic of twenty states and two territories, with a Federal district for its capital. Its name, given by the early explorers, was derived from the word *Venice,* and had reference to the island homes of the aborigines of the Orinoco region, many of whom dwelt in the treetops, as sung in Thomson's lines:

Wide o'er his isles the branching Oronoque
Rolls a brown deluge, and the native drives
To dwell aloft in life supporting trees,
At once his home, his robes, his food and arms.

The republic has an area of 393,976 square miles, a greater area than Texas and New Mexico combined, and 40,000 square miles larger than British Columbia. The population in 1915 was estimated to be 2,764,240.

**The People and Their Cities.** The white people are very generally of Spanish descent, and constitute the ruling class. They represent the culture of Spain. There are many Indians, especially in the llanos, and among the *mestizos* (natives) there is considerable negro blood.

Venezuelan authors have shown the life and character of their countrymen in its most favorable light. Baños, in his history of the Spanish conquest, expresses the love and admiration of the patriotic Venezuelan for his country. The Indian *llaneros,* or herders on the llanos, are sympathetically portrayed by Baralt, another Venezuelan author, who tells of their strength, their wonderful dexterity, their love of wild freedom, their fidelity to friendship and to any trust (despite their ferocity), their love of music, both instrumental and vocal, and their ability to improvise songs in rude and primitive minstrelsy.

The white population is well distributed in the plateau region instead of being concentrated in the cities. Caracas, the capital, had in 1915 a population of about 85,000. It is a governmental, residential and educational cen-

ter, rather than a commercial city. Maracaibo, on the strait connecting Lake Maracaibo with the gulf, contains 50,000 people. Valencia, westward from Caracas, has 40,000; the island city of Margarita has 20,000; Bolivar, up the Orinoco, is the market for the interior commerce; La Guayra, Puerto Cabello and Maracaibo, seaboard cities, are busy ports of international trade.

LOCATION MAP
Showing the place of Venezuela among the South American republics, and the proportion of the continent it occupies.

**Religion and Education.** The religion of the country is Roman Catholic, but all sects are given freedom of worship. Some of the old churches are very interesting. Education is free and compulsory in the elementary grades. There were in 1915 about 1,500 elementary schools, with 50,000 pupils; fifty-eight secondary schools for boys, thirty-eight for girls and six for the education of both sexes. Caracas has a normal school for women and one for men. There are two vocational schools, thirty-four national schools for higher instruction and twenty-one academies, aided by the government. Caracas and Merida both have universities, and in various cities are military, commercial and other special schools. Despite this attention to education, however, about seventy-five per cent of the inhabitants cannot read and write.

**Physical Features and Climate.** With respect to its physical features, Venezuela is divided into three district regions, known as the llanos, the plateaus and the mountain districts. The llanos are the river valleys and low, wet plains, suited to the pasturing of great herds of cattle. The plateaus are much cooler and drier, and because of their elevation are pleasant and wholesome. The eastern spurs of the Andes Mountains are in the northwestern and northern part. In the northwest occurs the loftiest altitude in Venezuela, the Sierra Nevada de Mérida, which reach a height of 15,400 feet.

The famous Orinoco, meaning *coiled serpent,* is the great river of Venezuela, and has hundreds of tributaries, among which is the Cassiquiare, which also connects with the Rio Negro, a branch of the Amazon. Facing the delta of the Orinoco is the island of Trinidad, which belongs to Great Britain. The island of Margarita is famous for its pearl fisheries. There are a number of smaller islands off the northern coast belonging to Venezuela, but Margarita is the only one of importance. Lake Maracaibo, in the west, connected by a strait with the Gulf of Maracaibo, is a hundred miles in length. The region of this lake is the chief agricultural district of the country.

Venezuela lies wholly within the tropics, but it has its well-marked climatic zones. These, however, are determined not by latitudes but by altitudes. The temperature in the hot zone varies from 74° to 91°, that of the temperate zone from 50° to 77°, and that of the cold zone from 0° to 60°.

**Products and Commerce.** Asphalt, coffee, gold, salt, pearls, beef, tropical fruits, woods, leather and hides, cacao, rubber, tobacco and medicinal plant products are among the varied sources of Venezuela's wealth. The famous

COMPARATIVE AREAS
Venezuela is slightly larger than Washington, Oregon, Idaho and Montana.

pitch lake of Trinidad and the Lake of Bermudez in Venezuela are the greatest sources of asphalt in the world. Thirty-two million tons of asphalt have been sent to the United States in a single year. Modern refrigerating plants for supplying meats for shipment are a new development in Puerto Cabello and in Baranco, on the Orinoco. A cocoanut butter and oil factory has been established at Cumaná, and there has been in recent years an increase in sugar manufacture. Agriculture, however, is the chief industry; coffee ranks first among the crops and among the exports. Other crops of importance are cacao, which is produced in the

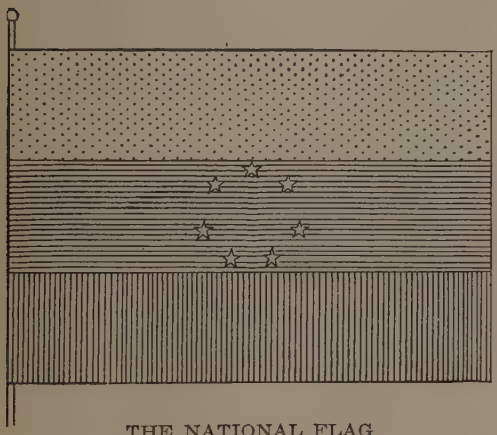
humid coast lands; sugar, very little of which is exported; vanilla and tonka, a substitute for vanilla.

There is need for much improvement in the building of roads, as away from the larger cities these are little more than mule paths. Arrangements have been made since 1915 for extending and improving the river steamship service, and for new repair docks at Puerto Cabello which will promote commerce. Only in the vicinity of Caracas has there been any extensive railway system, but there are various short lines running independently. Practically all of these have been built with British capital.

The imports of Venezuela for the year 1915 were valued at $13,470,000; the exports, at $23,404,000. The United States has led all other nations in Venezuelan trade since 1912; in 1915 it received considerably more than half the total exports, due to the war in Europe. In normal years France receives nearly as great a volume of the exports as the United States.

## *Government and History of Venezuela*

**Government.** Under the new constitution, adopted in 1914, there are in the national Congress two Senators from each state, or forty in all; members represent districts of 35,000 inhabitants in the Chamber of Deputies. The President is elected by the Congress for a term of seven years, and there is no Vice-President. The seven Justices of the Supreme Court are elected by the Congress for seven years. The Federal government has limited powers, and the states are self-governing under their several constitutions. The executives of the states are called *presidentes*.



THE NATIONAL FLAG
Dotted lines represent yellow; horizontal lines, blue; vertical lines, red. The stars are white.

**History.** Venezuela was the mainland of America which Columbus discovered August 1, 1498, on his third voyage. It was visited later by Amerigo Vespucci, whose fame at one time outran that of Columbus, and whose first name, changed to *America*, was bestowed on both continents of the western hemisphere.

The population then comprised 150 different tribes of Indians, speaking an equal number of dialects, with eleven wholly different languages. The warlike Caribs and Teques for a time prevented permanent settlements, offering more resistance than was encountered by the Spanish elsewhere in America. In the middle and latter part of the sixteenth century, however, a number of colonies were established. In the seventeenth century the British, French and Dutch buccaneers periodically plundered the coast towns, and the outlawry of the "Spanish

STATUE TO HEROES OF INDEPENDENCE AT CARACAS.

## *Outline and Questions on Venezuela*

**I. Size and Position**

(1) Area
  (a) Actual, 393,976 square miles
  (b) Comparative
(2) Latitude, 1° 40′ south to 12° 26′ north
(3) Longitude, 59° 40′ to 73° 31′ west
(4) Boundaries

**II. Geographic Features**

(1) Three distinct regions
  (a) Llanos
  (b) Plateaus
  (c) Mountain districts
(2) Rivers
  (a) Orinoco
  (b) Lesser streams
(3) Lake Maracaibo
(4) Climate
  (a) Dependent largely on altitude

**III. Industries, Commerce and Transportation**

(1) Chief industry—agriculture
  (a) Chief crop—coffee
(2) Mineral products
  (a) Asphalt
(3) Manufactures
(4) Transportation
  (a) Railway mileage
(5) Commerce

**IV. The People**

(1) Population, 2,764,241
(2) Inhabitants
  (a) Spaniards
  (b) Indians
  (c) Mestizos
(3) Education
(4) Religion
(5) Cities

**V. Government**

(1) Limited Federal powers
(2) The states
(3) Three branches of government

**VI. History**

(1) Discovery by Columbus
(2) Difficulties of settlement
(3) Spanish rule
(4) Independence
(5) Internal troubles
(6) Quarrels with other nations

## *Questions*

What does the name of Venezuela's chief river mean? Can you discover, on the map of South America, any reason for this name?

What does the name *Venezuela* mean, and why was it applied to this region?

What, according to Venezuelan writers, are the chief virtues of the Indian herders of the plains?

In a representative gathering of 1,000 Venezuelans, how many, approximately, would be able to read and write?

What and where are the llanos?

What is the chief factor in determining the climatic conditions of the various parts of the country?

What substance that we see often on our streets is found in great plenty in Venezuela?

main" supplied materials for romance, proverb and ballad.

In 1742 Venezuela received a captain-general from Spain, and its history was thence a record of order and general prosperity for a long period. Independence was attempted first in 1797, then again in 1805, under Miranda, but both attempts failed. Caracas revolted in 1810, a constitutional convention met in 1811, and independence was declared in 1812; but again the patriot band was overthrown. From 1813 to 1821 Simon Bolivar led the republican forces, and his defeat of the royalists at Carabobo (June 24, 1821) ended Spanish rule in Venezuela. In 1819 Venezuela joined the United States of Colombia, but in 1829 it seceded, and it has since maintained its independence. For about seventeen years thereafter there was peace at home; then for a quarter century there was strife between the Liberals and the Conservatives. Slavery was abolished in 1854.

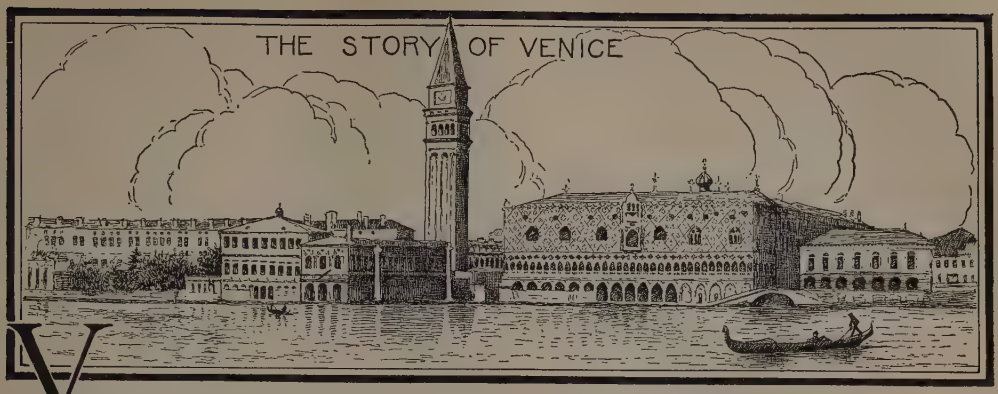
A controversy was waged from 1821 to 1889 between Venezuela and the British government as to the boundary separating the republic from British Guiana. The United States, appealed to in 1887, secured a reference of the whole matter to arbitration, and Venezuela, though somewhat dissatisfied with the compromise effected, was compelled to accept it. In 1899 Cipriano Castro, without good reason, headed a revolution against President Ignacio Andrade, and after a warfare of two years was recognized as President by the Congress. He became insolent to the creditor nations of Europe in the matter of Venezuelan indebtedness, and in 1902 Great Britain and Germany severed diplomatic relations with the republic. A "peaceful blockade" of Venezuelan ports by these nations and by Italy resulted in another appeal to the United States; the matter in dispute was referred to The Hague tribunal. In the fall of 1908 Castro visited Europe for surgical treatment, leaving the government in the hands of Juan Vicente Gomez, who speedily secured his own election to the Presidency. The new constitution of 1914 gives promise of order and stability.

H.M.S.

Consult Triana's *Down the Orinoco in a Canoe;* Scruggs' *The Columbian and Venezuelan Republics;* Dalton's *Venezuela.*

**Related Subjects.** In connection with this study of Venezuela the reader may consult the following articles in these volumes:

| | |
|---|---|
| Asphalt | Llanos |
| Bolivar, Simon | Maracaibo |
| Caracas | Orinoco |
| Coffee | Trinidad |




VENICE, *ven'is,* an Italian city at the northern end of the Adriatic Sea, one of the most beautiful and most interesting municipalities in the world. It is unique, first of all, in its situation, for it is built on a cluster of islands in a sheltered lagoon between the mouths of the Piave and the Po rivers. Thus appropriately did Longfellow address it, in his *Venice*—

White swan of cities, slumbering in thy nest
So wonderfully built among the reeds
Of the lagoon.

The city is a perpetual memorial of the great periods of architecture, for its splendid cathedrals, palaces and public edifices represent the Byzantine, the Romanesque, the Gothic and the Renaissance modes of building at their best. In literature it is renowned as the scene of one of Shakespeare's greatest plays—*The Merchant of Venice.* During the Middle Ages the city was one of the world's chief commercial centers, and it can look back to a glorious history. It is sometimes said that the Venice of to-day shines in the reflected light of its former greatness, for the city has an indescribable air of sadness and decay. Byron had this in mind when, standing on the "Bridge of Sighs," he looked over the city and thus reflected on its past—

A thousand years their cloudy wings expand
Around me, and a dying Glory smiles
O'er the far times, when many a subject land
Look'd to the winged Lion's marble piles,
Where Venice sate in state, throned on her hundred isles.

Yet it is still the "Queen City of the Adriatic," and a source of endless delight to the art lover.

**General Description.** The city is situated 164 miles by rail east of Milan. The islands on which it lies are nothing more than mud banks, in the unstable soil of which the buildings are supported by pile drivings. There are about 16,000 structures on pile foundations, and these for the most part look down upon winding canals instead of streets. Long, flat-bottomed gondolas, painted black and with ends curving picturesquely from the water, take the place of the cab and street car of the ordinary city.

The islands fall into two main groups, separated by the famous Grand Canal, which follows a zigzag course from the railway station at the northwest to the Doge's Palace on the southeast. There are about 150 smaller canals, and also a number of paved streets and picturesque, crooked lanes. Four hundred bridges, most of them built of stone, cross the waterways and contribute their element of charm and fascination. Two of them, the Rialto and the "Bridge of Sighs," are world famous. The former, in the heart of the city, spans the Grand Canal by a single arch thirty-two feet high, and is lined with shops. The latter, which crosses a narrow canal separating the state prison and the Doge's Palace, is pictured in these volumes, page 925.

**Piazza of Saint Mark.** This celebrated square deserves special treatment, for it is the center of interest in Venice. Its eastern side is occupied by Saint Mark's Cathedral and the Doge's Palace. Saint Mark's ranks next to the Mosque of Saint Sophia, in Constantinople, as a noble example of Byzantine architecture. The Doge's Palace (see illustration, page 1830) is an example of Italian Gothic architecture, and is noted for the beauty of its interior and for its priceless collection of paintings. The south side of the Piazza is occupied by the New Procuratie and the opposite side by the Old Procuratie, two fine buildings representative of the Renaissance style. They were the residences of former officials known as *procurators,* and date respectively from 1584 and 1496. The newer structure is a continuation of a magnificent library building begun in 1536, which is

regarded by competent critics as the most ornate example of Renaissance architecture in the world. The group now constitutes the Royal Palace. Near by is the famous Campanile (bell tower) of Saint Mark's, described and pictured on page 1086.

Another interesting landmark in the square is an old clock tower dating from 1496, and

Venice once was dear,
The pleasant place of all festivity,
The rival of the earth, the masque of Italy.
—Byron: *Childe Harold.*

there are numerous monuments of historic and artistic interest. Both Procuratie are lined with shops and cafés. The Piazza is a place of activity by day and by night, and often on moonlight nights there are band concerts to delight the throngs of people that congregate there.

**Along the Grand Canal.** Between the Piazza and the Rialto Bridge there are numerous interesting structures, such as the imposing Church of Santa Maria della Salute; the famous Academy of Fine Arts, containing Titian's *Assumption of the Virgin* and paintings by Bellini, Paul Veronese and other masters; the Palazzo (Palace) Rezzonico, where Browning died; and the Palazzo Mocenigo, home of Byron. Beyond the Rialto are the markets; the Municipal Museum, with its collections of gems, carvings and other works of art, and numerous beautiful palaces of varying styles of architecture. Indeed, a journey down the Canal affords one an impressive study of the art of the Middle Ages.

**Other Features of Interest.** A detailed description of the many beautiful churches of Venice is not possible here, but mention should be made of some of them. The Church of San Salvatore (1534), noted for its fine dome, possesses one of the world's masterpieces—Titian's *Annunciation.* Another splendid edifice, the Gothic Church of the Frari, is noted for its beautiful altarpieces; the Scuola di San Rocco is adorned with some of Tintoretto's mural paintings, including his *Crucifixion.* Other notable churches include the Jesuit, the interior of which is inlaid with marble; the San Sebastiano, containing altarpieces by Paul Veronese and the tomb of the artist; and the San Giorgio Maggiore, whose beautiful bell tower is an excellent vantage point from which to view the city.

One of the special points of interest is the Arsenal, a great collection of wharves, dockyards and magazines filled with military stores of every description. It was famous throughout Europe in the period of the city's commercial glory, and until the War of the Nations was the largest arsenal in the world, employing 6,000 men. The Arsenal Museum contains a model of the *Bucentaur,* the state barge from which the Doge, on Ascension Day, solemnly wedded the city to the Adriatic by casting a ring into the water. By this unique ceremony Venice celebrated its supremacy on the seas.

**Industries and Commerce.** A period of decline followed the medieval era of commercial expansion, but within recent years Venice has prospered greatly in many fields. The manufacture of torpedoes, the building of ships, the making of beads and glass and the production of laces, brocades, tapestries, jewelry and other artistic wares are all flourishing industries. The shops of Venice vie with those of Paris. In the number of ships entering and clearing the harbor each year the city ranks seventh among Italian ports, but in the value of its foreign trade it holds third place.

**History.** The city traces its origin to a group of huts built on the islands in the fifth century by a band of refugees fleeing from Attila's Huns. Gradually there developed out of a collection of villages a city state which, in the year 697, elected as its ruler an official bearing the title of *Doge.* In 810 the islands called the Rialto, in the center of the Venetian lagoon, were chosen as the seat of government. The republic, thus unified and strengthened, entered

upon a period of expansion, and by the middle of the fifteenth century it was the head of a vast colonial empire and the most powerful maritime state of the Christian world. Its trading vessels were found in the harbors of every civilized country on the globe. In this very century, however, the power of the island republic began to wane. The fall of Constantinople, in 1453, brought the Venetians into a losing conflict with the Turks, and the discovery of a new water route to India, by Vasco da Gama, and of the New World, by Columbus, opened up new trade channels and proved the deathblow to Venetian commercial supremacy.

In 1797 the Venetian republic was dissolved by Napoleon, and its possessions were transferred to Austria and France. In 1866 Venice was incorporated with Italy, and its history since that date has been a part of the history of the Italian kingdom. From the time that Italy entered the War of the Nations on the side of the entente allies Venice was subjected to attacks by hostile airships, but it suffered comparatively little damage. In November, 1917, an enemy invasion threatened the city and its art treasures were removed to Florence. The Austro-German forces reached within a few miles of the Adriatic coast.. The city's population was 160,719 in 1910; in 1914, 163,202 (estimated). B.M.W.

Consult Lucas's *A Wanderer in Venice;* Headlam's *Venetia and Northern Italy.*

**Related Subjects.** In connection with this description of Venice, the reader may consult the following articles in these volumes:

| | |
|---|---|
| Adriatic Sea | Doge |
| Bridge of Sighs | Saint Mark's, Cathedral of |
| Campanile | |
| City States | |

**VENIZELOS,** *ven e za' lohs,* ELEUTHERIOS (1864- ), a Greek statesman who took a prominent part in bringing Greece into the War of the Nations on the side of the entente allies. He was born on the island of Crete, and was educated in the Cretan town of Canea and in Athens, completing a course in law at the University of Athens in 1886. His public career began in Crete, where, after winning honors at the bar, he entered the legislature. He worked zealously for the political union of Crete and Greece (see CRETE), and in 1910 removed to Athens to become the leader of a new party sponsored by the Military League, which was then working for a reform of the constitution. The same year King George offered Venizelos the office of Premier, and the latter accepted. In this capacity he took a leading part in the organization of the Balkan League, and was a prominent figure in the Balkan Wars of 1912-1913 (which see).

When the War of the Nations broke out in 1914, Venizelos and King Constantine, who had ascended the throne in 1913, came to a parting of the ways. The Premier urged that Greece join the entente, and the king was firm for neutrality; the queen was a sister of the German emperor. It was clear that the king and Premier could not work together, and the Premier resigned in March, 1915. He was, however, persuaded to form a new Ministry in August, and when the Bulgarian army was mobilized in September, he insisted that the Greek forces likewise be mobilized. This was accomplished in spite of the king's opposition.

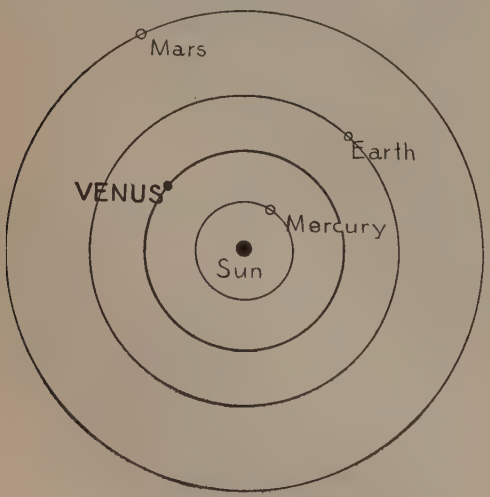
Then followed Bulgaria's declaration of war upon Serbia. As Greece was bound by treaty to assist Serbia in case of attack by Bulgaria, Venizelos demanded that the country take immediate action to carry out its agreement. Upon the refusal of Constantine to assent to this program the Premier again resigned, though he was supported by the majority of the deputies in Parliament. Finally, in September, 1916, he and his followers set up a provisional government at Canea, later transferring it to Saloniki. In June, 1917, Constantine was forced by the allies to abdicate, and his son Alexander came to the throne. Venizelos was then returned to power, and Greece joined the coalition against Germany. See WAR OF THE NATIONS. B.M.W.

**VENTILA'TION.** See HEATING AND VENTILATION.

**VENTRILOQUISM,** *ven tril' o kwiz'm,* the art of projecting the voice in such direction as makes it appear to come from another source. Long and arduous practice is necessary to develop this faculty into a high art. The sounds are produced in the usual method adopted in talking, but lip movement and facial expression are almost entirely lacking. The lips are held as nearly motionless as possible, the tongue being drawn well back, allowing only the tip to move. Consonants are often changed to avoid lip-moving syllables; for instance, the letter P becomes a K, the word potato being pronounced as if it were *kotato;* B is treated in the same way and is quickly slurred into a G or K. The more a performer directs attention to the place from which the sound is supposed to come, the more will the audience be deceived.

**VENUS,** the most brilliant and conspicuous of all the planets, is second in distance from the sun, and was named for Venus, the mythological goddess of beauty and love. Among the Greeks this planet had two names, *Phosphorus,* or *Lucifer,* the Light Bearer, as morning star, and *Hesperus,* as the evening star. In size, surface and density Venus is very similar to the earth. It is at an average distance of 67,200,000 miles from the sun, and its orbit brings it at times nearer to the earth than any other heavenly body except the moon and occasionally a comet. Its orbit lies between Mercury and the Earth, and it completes its revolution round the sun in 225 days. Its diameter is 7,700 miles, its surface more than nine-tenths that of the earth, and its density very little less than the earth's density. The *albedo,* or reflecting power of Venus is very great, being three times that of the moon and four times that of Mercury; the planet reflects more than half the light which falls upon it. The disk of Venus appears brightest at the edges, in this respect being like the moon.

**Atmosphere of Venus.** That Venus has an atmosphere is clearly established, and it is thought to be considerably more dense than the atmosphere surrounding the earth. The presence of this atmosphere renders observation difficult, as the actual surface of the planet can barely be seen. The presence of atmosphere is indicated in the transit of Venus by rings of light, due to the reflection and scattering of collected sunlight by its atmosphere. The presence of a great number of clouds is quite generally accepted, as rocks or soils could not have such high reflecting power. Like the moon, Venus presents different phases, varying from the new moon crescent to the full circle and then decreasing, as in the case of the moon.




ORBIT OF VENUS
Also of the three other "inner" planets.

**Transit of Venus.** At certain periods the orbit of Venus brings the planet directly between the earth and the sun, across whose disk it appears to travel. To the naked eye it then appears merely as a black spot. The track of the transit is seldom across the center of the sun's disk, but when that does happen it occupies about eight hours, being, of course, shortened when the transit occurs nearer the edge of the sun's disk. The transits of Venus are studied by astronomers with the greatest interest, and expeditions to points where they may be advantageously observed are fitted out by most of the great educational institutions. The dates of the transits can be calculated with accuracy years beforehand; transits of Venus were observed in 1631, 1639, 1761, 1874, 1882; others are foretold for June 8, 2004, and June 6, 2012. F.ST.A.

**VE'NUS,** the Roman name for the goddess of love and beauty whom the Greeks called *Aphrodite.* Some legends make her the daughter of Jupiter, but most of them declare that she was sprung from the foam of the sea near the island of Cythera, whence she proceeded to Cyprus, the nymphs Love and Desire attending her. When she appeared on Olympus in all her beauty, a golden wreath on her head and her silky ringlets floating about her breast, she excited the admiration of all the gods, who united to do her honor. They all proposed marriage to her, but she scornfully rejected them and provoked their enmity to such an extent that they picked out for her husband the lame and deformed Vulcan. Venus, though at first interested in Vulcan's strange home and glowing forges, was not long faithful to such a husband, but deserted him and fell in love with Mars, Adonis and Anchises in succession. She was a great friend of lovers, and many a time interfered to remove obstacles that separated them. Sometimes she even loaned to favored mortals her magic girdle, which had the power of inspiring love for the wearer, nor was she careful to bestow her favors justly.

The ancient artists, especially Praxiteles and Apelles, made her the ideal of womanly beauty. She is usually nude, or but slightly clad, and is often shown rising from the sea foam and shaking the water from her hair. The Venus de Milo is the most famous representation.

Consult Gayley's *Classic Myths in English Literature and in Art;* Fairbanks' *A Handbook of Greek Religion.*

**Related Subjects.** The following articles in these volumes will make clear the references in the above discussion of Venus:

Jupiter
Mars
Nymphs
Venus de Milo
Vulcan

See, also, Mythology, page 4041.

**VE'NUS DE MILO,** *me'lo,* a magnificent marble statue of the Greek goddess Venus, or Aphrodite, one of the treasured possessions of the Louvre, in Paris. It was found by a peasant in 1820 on the Island of Melos, where it had remained hidden for centuries in a niche of the wall of an ancient theater. It had suffered severely during the centuries. When discovered it was in two parts. After its restoration it was given to Louis XVIII of France, and he presented it to the Louvre. Who the sculptor of this admirable work of art was and when it was executed is unknown, but it is undoubtedly a work of the first or second century B. C., and is an adaptation of a statue of the goddess by Scopas. In nobility of conception and beauty of workmanship the *Venus de Milo* shows the influence of Greek sculpture of the period of glory—the era of Phidias. In the Louvre it is placed at the end of a long corridor of statuary, where it dominates everything around it. See SCULPTURE.

VENUS DE MILO

Consult Furtwängler's *Masterpieces of Greek Sculpture,* translation by Sellers.

**VENUS'S FLYTRAP,** or **DIONAEA,** *di o ne'a,* an interesting plant of the sundew family, which bears leaves designed to serve as traps to capture insects. These insects make up for a deficiency of nitrogenous plant food, as the plant grows in soil in which nitrogen is lacking. It is found naturally only in bogs in North and South Carolina, but is occasionally grown in greenhouses as a curiosity. The flower stalk, bearing at the top a cluster of small, white blossoms, rises from a tuft of oddly-shaped leaves. These are in two parts, a lower, bladelike portion and an upper one consisting of two lobes hinged to a midrib. The surface of each lobe bears a few sensitive, hairlike processes, and the edges are fringed with sharp bristles. An insect alighting on one of these hairs is caught between the two lobes, which close together like the sides of a trap. The soft parts of the insect are then digested by a fluid secreted by special glands, and when the food is entirely assimilated the trap opens, and the plant is in position for another victim. It is an interesting fact that after a leaf has functioned in this way a few times it loses its vitality and dies. See CARNIVOROUS PLANTS.

VENUS'S FLYTRAP

**VERA CRUZ,** *va'rah krooz',* the chief seaport of Mexico, is situated on the Gulf of Campeche, an arm of the Gulf of Mexico (see colored map, opposite page 3768). It is 263 miles by rail and 193 miles in a direct line east of Mexico City, and occupies a low, marshy plain extending for about a mile along the gulf. Guarding the harbor is the old Spanish fortress of San Juan de Ulloa, on a rocky island half a mile from the shore. Vera Cruz is a walled city of interesting appearance, with wide, straight streets and coral limestone houses, built in Spanish style. Its unhealthful situation and the depressing climate of the region have hindered the city's development, but it is outliving its reputation as "the City of the Dead" through the construction of modern drainage and water systems and other sanitary improvements. Due credit for improved conditions should be given to the United States marines

who occupied the city in 1914, at the time when Huerta's insult to the American flag made war with Mexico a possibility. Under the direction of Robert J. Kerr, who was appointed civil governor by Admiral Fletcher, the prison of San Juan de Ulloa and the town itself were given a thorough and much-needed cleaning.

The most notable institutions of the city are the artillery school, a national school for sailors, the public library and one of the best hospitals in Mexico. The industrial establishments include fruit-preserving plants, cigar, furniture, broom, toy and candy factories. Fishing is an important occupation, and there is a prosperous export trade in ores, coffee, tobacco, sugar, hides, rubber and dyewoods. Vera Cruz was founded in the sixteenth century by Cortez, and has had a somewhat troubled history. It has been twice occupied by American troops—in 1847 and in 1914 (see MEXICO, subtitle *Government and History*). Population in 1910, 40,000.

**VERB,** that part of speech which is used to assert something of a person or thing. In a sentence the verb is the *predicate,* and that of which it asserts something is the *subject.* Some verbs express action, and others express being or state of being, as in the following: "The storm *wrecked* the house;" "The house *is* a wreck;" "The king *lives.*" Action verbs give life and movement to language. A more vivid effect is obtained, for instance, by use of the expression, "The mountains rise 10,000 feet above the plain," than by the statement "The mountains are 10,000 feet high." There can be no complete expression of a thought without a verb. In the two expressions, *The brave soldier* and *The soldier is brave,* there is one idea brought out—the bravery of the soldier; but in the first case the idea is merely suggested, in the second the idea is asserted by means of the verb. The latter expression is a complete sentence.

**Classes of Verbs.** A comparison of the sentences, *The storm wrecked the house* and *The house is a wreck,* shows that the first differs from the second in the important particular that it contains an object *(house),* which is used to complete the meaning of the verb *(wrecked).* Verbs which take or may take objects are said to be *transitive;* verbs which require no objects, that is, which exert no action on objects, are called *intransitive.* There are many verbs, however, which are used both transitively and intransitively, according to the meaning they convey. A type verb of this kind is the verb *sing,* as shown in the following: *She sings this song beautifully; She sings beautifully.* Forms of the verb *to be* are always intransitive, and this is true of most verbs which do not express action.

Another classification, dividing verbs according to their use, distinguishes between *principal* and *auxiliary* verbs. A principal verb is one that is used by itself to express action or state, or which, if used in combination with some other verb, has the leading place in the expression of the thought; auxiliary verbs are helping verbs, and they do not express complete ideas by themselves. They are *be, can, do, have, must, shall* and *will.* In the expression *will run, will* is the auxiliary, and *run* is the principal verb. It should be noted that *be, do* and *have* are sometimes used as principal verbs. In the expression *I have a book, have* is a principal verb, but in *I have taken my books home, have* is used with *taken* simply to express a certain tense form, and is a pure auxiliary.

Verbs are further classified as to their change in form. According to some authorities those verbs which form the past tense and past participle by adding *d* or *ed* to the present tense are regular; they call those verbs *irregular* which make these changes in other ways. *Love* (past tense *loved*) by this classification is a regular verb, and *run* (past tense *ran*) is an irregular verb. Other authorities prefer to call those verbs that form the past tense by a change of vowel in the root form *strong* verbs, and those that add an ending to the present tense *weak* verbs. In this classification *run* is a strong verb and *love* is a weak verb. The weak verb may change the root vowel and also take an ending, as *lay (laid)* and *catch (caught).* Other authorities use the terms *old* and *new* and *ancient* and *modern* to distinguish verbs in respect to changes of form, but discussions of this sort, though of interest to philologists, are not of great practical value to the student of grammar.

**Properties of Verbs.** Verbs have five properties—*voice, mode, tense, person* and *number.* By this is meant that verbs have certain forms by which they express certain qualities.

*Voice* is a quality that belongs only to verbs used transitively. It denotes whether the subject is acted upon by the verb, or whether the subject is the actor. When the verb expresses action on the part of the subject, it is in the *active voice,* as *The teacher read a story;* when the subject is represented as acted upon the

verb is in the *passive voice,* as *The story was read by the teacher.* For a detailed discussion of this property see the article VOICE.

*Mode* (or *mood*) is that property of a verb by means of which we learn its *manner* of asserting; that is, whether the thing is stated as an actual fact, as doubtful, as a possibility, etc. All grammarians recognize the *indicative, subjunctive* and *imperative* modes, and some include the *potential.* See MODE, page 3870.

*Tense.* The time of an action or condition is indicated by *tense* forms. There are six tenses —*present, past, future, present perfect, past perfect* and *future perfect.* See TENSE, page 5757.

*Person.* A verb is said to be in the *first, second,* or *third* person according as it expresses the action or condition of a subject speaking, spoken to or spoken of. Only pronouns are fully inflected to express person; nouns have no such inflections, and, except in case of the verb *to be* and the forms used after the archaic pronoun *thou,* the only verb form which shows person is the third person singular of the present tense. We say, for example, *I call, You call, He calls; We call, You call, They call.* See PERSON, subhead *Person in Verbs,* page 4597.

*Number.* A verb used as the predicate of a subject indicating one person or thing is said to be in the *singular number;* if the subject represents more than one, the verb is in the *plural number.* As in case of person, the only change in verb form to denote number occurs in the third person singular of the present tense. See NUMBER, page 4310.

The rule for the agreement of subject and verb is as follows: *A finite verb must agree with its subject in person and number.*

**Verbals** are words which express action or state of being in a general way, but which cannot of themselves assert anything of a subject. There are two kinds of verbals, *participles* and *infinitives.* Some authorities include a third—the *gerund*—but others regard the gerund as a form of participle. For full explanation see PARTICIPLE, page 4517, and INFINITIVE, page 2990.

**Conjugation.** To conjugate a verb is to carry it systematically through its different modes, tenses, persons and numbers, in both voices. A full conjugation begins with the principal parts of the verb—present indicative, past indicative and past participle—and concludes with the three participial forms—present, past and perfect. See CONJUGATION, page 1539.

**Parsing the Verb.** To parse a verb it is necessary to state whether it is regular or irregular; whether transitive or intransitive; its voice, if transitive; the object, if it is in the active voice; its mode, tense, person and number, and the subject with which it is in agreement. The following is a type of verb parsing:

*The merchant opened his new store last week. Opened* is a regular transitive verb in the active voice; its object is the noun *store.* It is in the indicative mode and past tense, and in the third person, singular number, to agree with the subject *merchant.*

**Common Errors.** The chief sources of error in the use of verbs are the employment of one verb for another which is similar to it in form or meaning; the confusion of two parts of the same verb; the violation of the rule for agreement. Some of the typical errors are covered in the following:

*You will find the book laying on the table* for *You will find the book lying on the table. Lay* is transitive and *lie* intransitive. It is correct to say, *Lay the book on the table* and *Let the book lie on the table. Set,* a transitive verb, is also frequently used for *sit,* which is intransitive.

Among the verbs similar in meaning, *learn* and *teach* are very often confused. *Learn* means *to receive instruction* and *teach* means *to impart instruction.* Therefore we say, *I learned quickly the lesson taught by the new master.*

The distinction between *shall* and *will* is explained in the article TENSE. Confusion in the use of *may* and *can* will be avoided if the student remembers that *may* is used to express permission, and *can* to express ability. In the sentence *John cannot go to the mountains with us* the idea conveyed is that John is unable to make the journey for some physical reason, such as lack of leisure or funds. *John may not go* conveys the idea that he did not obtain permission from some one in authority.

A very common error is the use of the present tense or the past participle for the past tense, as in the following: *I come home yesterday* for *I came home yesterday,* and *He seen me* for *He saw me.* The principal parts of the following verbs should be carefully learned:

| *Present* | *Past* | *Past Participle* |
|---|---|---|
| see | saw | seen |
| come | came | come |
| run | ran | run |
| do | did | done |
| give | gave | given |

The following sentences illustrate violations of the rule for agreement: *There comes the general and his staff* for *There come the general and his staff. He don't enjoy his work* for *He doesn't enjoy his work. Don't* is the contraction for *do not,* the plural form of the third person, and cannot be used with a singular subject.

B.M.W.

**Outline on the Verb**

(1) Definition
(2) Classes
  (a) Transitive and Intransitive
  (b) Principal and Auxiliary
  (c) Regular and Irregular
  (d) Other possible classifications
(3) Properties
  (a) Voice
  (b) Mode
  (c) Tense
  (d) Person
  (e) Number
(4) Verbals
  (a) Participles
  (b) Infinitives
(5) Conjugation
(6) Parsing the Verb.
  (a) Essentials to be stated
  (b) Type sentence
(7) Common Errors

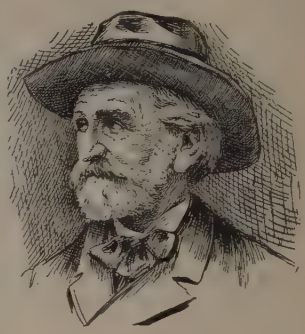
**Related Subjects.** In connection with this study of the verb, the reader may consult the following articles in these volumes:

| | |
|---|---|
| Conjugation | Participle |
| Grammar | Person |
| Infinitive | Sentence |
| Inflection | Syntax |
| Mode | Tense |
| Parsing | |

**VERBE'NA,** a genus of plants belonging to the vervain family. Several European species have been naturalized in America, and have become exceedingly troublesome in some parts of the United States. Almost all of the wild varieties are flowering weeds with four-sided stems and opposite or alternate leaves, bearing spikes of small purplish or white flowers, but many of those in cultivation have showy pink or purple flower clusters. In fact the blooms are seen in almost every color except yellow. The plants grow in moist meadows and in waste places, blossoming in the United States and Canada from June to September. In tropical countries certain species attain the height of trees, but those of temperate climates are herbs or shrubs.

THE VERBENA

**VERDI,** *vair'de,* Giuseppe (1813-1901), possibly the most popular of all opera composers, was born at Roncole, not far from Parma, Italy, October 10, 1813. His father was the humble keeper of the village store and inn, an honest man, ambitious for his son to rise to a higher station in life. In 1814 the village was invaded by Austrian troops, and many of the women and children were slaughtered in the church. One child was hidden in safety with his mother in the bell tower, and this child was little Giuseppe Verdi. The boy showed early fondness for music, but he did not seem to be unusually talented in his early years, either in his playing or in composition.



VERDI

When he was seven years old he was given a small piano by his father, and he practiced so earnestly upon it that when some portions needed repairs the admiring village mechanic would take no pay for the work. The kind-hearted man placed an inscription within the piano stating his reasons for the charity, and the old instrument is now among Verdi's effects. The name of Stephen Cavaletti, the humble village workman, will be remembered as long as the career of Verdi is studied.

At eight years of age Verdi began to study organ music in his native city, but within six months had learned all the organist knew of the art. He was then sent to school at the neighboring village of Busseto, and he paid three cents a day for tuition, a sum of money that his poor father almost starved himself to procure. Indeed, the poverty of the family was so great that at the age of ten the child had to become a clerk for a Busseto merchant, and from that time he earned his own living. This merchant introduced him to the organist of Busseto Cathedral, who taught him music for three years. Meanwhile, when the boy was eleven years old, he was appointed organist at Roncole, and though the salary was but a little over seven dollars per year, he was able to assist his hard-worked father.

In his fifteenth year he went to Milan to enter the conservatory of that city, but was refused admission because the faculty discovered that he had no special talent for music! Verdi immediately placed himself under the instruction of the conductor of the famous Scala

Theater at Milan, and by his eighteenth birthday knew far more about composition and orchestra directing than the school could have taught him in the same period. In 1838 he removed permanently to Milan. He had married some years before, and the struggle to maintain his wife and two children was a bitter one. In 1839, however, an opera of his was accepted for the Scala Theater, and the price paid him, nearly four hundred dollars, gave him more money at one moment than he had had in all the previous years combined. Commissions for three new operas immediately followed, and then came a shock that almost drove Verdi insane. Within a period of eight weeks his wife and children died. It was almost a year before he returned to his music, and then extraordinary success crowned his work. He was paid $4,000 simply for the right to publish one of his operas, and in later years he received for *Aïda* $20,000 merely for the right to present it the first night.

His earlier operas, such as *The Corsair,* were imitative of works by Rossini and other composers, but Verdi's tunes were far more spirited, and they fascinated his audiences. In the middle period of his musical career he broke away from old methods and composed with such unity and vigor that he became the most popular writer of operas in the world. Such compositions as *Rigoletto, Il Trovatore* and *La Traviata* are hardly equalled in public favor. Some critics still maintain that these works are too noisy, and that the bass instruments are too prominent, but the world as a whole seems not to think so. By 1859 Verdi was a rich man, and for the next eleven years he wrote almost nothing. Then, in 1870 the khedive of Egypt requested an opera from him for a Cairo theater, and the result was *Aïda,* generally considered as Verdi's best work.

Again he retired from the musical world, and his friends had concluded that his genius was dead; but in 1887 he produced his vigorous *Otello,* founded on Shakespeare's *Othello.* Six years passed, and then, just before his eightieth birthday, he wrote *Falstaff,* one of the most humorous of all operas, and almost equal in humor to the Shakespearean character that inspired it. Thousands of citizens journeyed to Milan from all parts of Italy to see the first performance of this opera, in February, 1893, and the greeting given the old man has scarcely been equalled in musical history. There followed seven years of silence and rest, and then death at Milan, January 27, 1901. R.D.M.

Consult Visetti's *Verdi;* Crowest's *Verdi: Man and Musician.*

**VERDIGRIS,** *vur'di grees,* a poisonous, bright-green pigment, made by the action of crude acetic acid on copper. The color of the pigment varies from blue to green, and the composition varies slightly with the color. It is used in dyeing, calico printing, in making Paris green and in paint manufacture, and sometimes in the preparation of medicinal liniments and salves. Taken internally it is an irritant poison for which milk and white of egg are antidotes.

**VERDUN,** *vair duN',* a fortified town in the northern part of France, about 140 miles northwest of Paris and forty-three miles east of Metz, in Lorraine. It lies on the right bank of the Meuse River and on the main line of the Eastern Railway between Metz and Paris. The fortifications about Verdun are a part of the advanced line of defense of the republic, and since the Franco-German War, when the place was bombarded and captured, they have been vastly strengthened. With the great French army in front of them, they successfully withstood one of the greatest assaults in history during the War of the Nations (see below). At the outbreak of the war the town had a population of over 21,000.

**Battle of Verdun.** In February, 1916, a German army commanded by the Crown Prince began a determined attack on the outer defenses of Verdun. It is believed that the object of the assault was the winning of a decisive victory which would open a breach in the line of defenses about Paris and discourage the allies from further prolonging the war. General Henri Pétain (which see) commanded the French forces. From February to September the Germans, by violent artillery bombardments and desperate infantry attacks, fought their way through lines of forts and intrenchments and gained about 130 square miles of territory. Verdun itself, however, remained unconquered, and to accomplish what they did the Germans sacrificed between 250,000 and 500,000 men. The battle was counted a French victory.

In July the allied forces began an offensive along the Somme (see SOMME, subhead *Battle of the Somme*), and this drive caused the German command to withdraw some of its forces along the Meuse. During the summer and early fall little was heard of the Verdun sector, but in October, General Nivelle, who had superseded General Pétain, suddenly delivered a counterattack on the east bank of the Meuse,

north of the town. The new offensive resulted in the recapture of Douaumont village and fort, Thiaumont Farm, Redoubt, Fort de Vaux, Damloup village and Vaux village. In December a second offensive was launched and several other strategic positions along the east bank of the Meuse were recaptured. Throughout 1917 there were intervals of violent fighting in the region of the Meuse, and late in the year the French reached the position which had marked their second line in February, 1915. See MEUSE, and map on page 3762; also, WAR OF THE NATIONS. B.M.W.

**VERDUN,** a residential suburb of Montreal, in Jacques Cartier County, Quebec. It is on the Saint Lawrence River and has connection by ferry with Montreal. The Grand Trunk and Canadian Pacific railways can be reached at Saint Paul, a mile from Verdun. Although primarily a suburban residence town, Verdun has a number of large industrial establishments. The largest of these is a munitions factory, established soon after the outbreak of the War of the Nations. The city owns and operates its waterworks and electric lighting plant. All water for the use of the public is filtered through mechanical filters. Verdun was founded in 1875, and was named for the historic Verdun in France. It was incorporated as a city in 1912. Population in 1911, 11,629; in 1916, estimated, 18,000.

**VERDUN,** TREATY OF, a treaty concluded in 843 by the three grandsons of Charlemagne—Louis, Charles and Lothair. It is celebrated as the first great treaty between European states. The great empire of Charlemagne had fallen to the emperor's weak son, Louis the Pious, and when he died, in 840, a bitter struggle ensued among his three sons. The war was concluded by an agreement which gave to Louis the region east of the Rhine, to Charles the lands west of the Rhone and the Meuse, and to Lothair the territory between these two sections, extending from the North Sea to the Mediterranean. In other words, the three rulers received the territory out of which developed modern Germany, modern France and modern Italy. Over a thousand years later the vicinity in which the treaty was signed was the scene of one of the most desperate battles in history (see VERDUN).

**VERESTCHAGIN,** *vyeh reh shchah' gin,* VASILI (1842-1904), a Russian painter of war scenes, who depicted not the great moments of fighting glorified by sentiment, but the horrors of the battle field, the suffering and the hardships. He worked from the viewpoint of one who was a warrior himself. Verestchagin was born at Novgorod, Russia. He received his early art training at the Academy of Design at Petrograd and later studied in France and Germany. In 1867 he joined the expedition against the Central Asian provinces, in which his valor won him the Saint George's Cross, and he produced a notable series of paintings illustrative of episodes of this expedition.

VERESTCHAGIN
He died in a battle which it was his intention to immortalize on canvas.

At the suggestion of President Roosevelt, on one of his visits to America he went to Cuba to paint sketches of the Santiago battle ground; the result of this journey is the large painting of *Roosevelt at the Head of the Rough Riders.* Among others of his notable works are *The Forefront of the Attack, The Letter Home* and *The Departure of Napoleon from Burning Moscow.*

Verestchagin was the historiographer of his times, but his fame rests not so much upon his technique as upon his choice of subjects. He died in the Russo-Japanese War, going down with a battleship which was sunk by the Japanese.

**VERGIL,** *vur' jil* (Publius Vergilius Maro), also spelled VIRGIL (70-19 B.C.), the name of a great Roman poet, who was born in Cisalpine Gaul, near Mantua, on the bank of the Mincio. His father, like the father of Horace, was of the poorer class, but like Horace's father, had by his industry acquired a small estate and sufficient means to give his son the best education which the Roman world afforded. After studying at

Cremona and at Milan, Vergil went to Rome, where he particularly delighted in his work in philosophy under the Epicurean Siron. Just what he did at the close of his period of Roman study is not known, for Vergil, unlike Horace, has little to say of his own life. It is probable, however, that he went back to his father's farm beyond the Po, and gave his time to literary composition. As he was not a Roman citizen, all careers in the Republic were not open to him, and even if they had been he was too modest and retiring to care for public life.

In the allotment of spoils to the soldiers of Antony and Octavian after the Battle of Philippi, Vergil, like Horace, lost his paternal estate; and though through the good offices of Asinius Pollio, governor of the territory in which he lived, he recovered it, further trouble arose, and he abandoned it permanently. Some of his friends, who appreciated his literary talent, urged him to go to Rome; in the capital city he made friends rapidly, despite his extreme shyness. Among these new acquaintances were Octavian and Maecenas, the foremost of the wealthy patrons of letters. The influence of these men secured for him an estate in Campania in place of the one he had lost, and the generosity of Maecenas made it possible for him to live without financial worry and to devote himself to poetry. Horace, too, was among the intimate and lasting friends he made at this time.

**The Aeneid His Masterpiece.** Octavian's friendship for Vergil continued when the former became Augustus, and it was under his encouragement that the *Aeneid* was begun. His impatience and that of the Roman people for the appearance of this national epic was great, and during the course of its composition the poet used to recite portions of it to his imperial patron and the royal family. Occasionally complimentary allusions to the emperor or some member of his household were introduced, and it is said that Octavia, the sister of Augustus, gave him a large reward for his lines on her son, who had died.

When the first draft of the *Aeneid* was finished Vergil went to Athens, intending to spend several years in Greece and in Asia Minor, revising and completing his great poem. The arrival of the emperor from the East, however, changed his plans, for Augustus prevailed on the poet to return with him to Italy. A visit to Megara in the burning sun overtaxed Vergil's constitution, always far from robust, and he was ill when he left Greece. He grew constantly worse on the voyage, and died a few days after landing at Brundisium. His pride in exquisite workmanship made him hesitate to leave the *Aeneid* in what he considered a very imperfect state, and he asked to have it burned, but the command of Augustus saved the precious manuscript. It was intrusted to Vergil's friends, Varius and Tucca, who edited it most carefully, making only such changes as were absolutely necessary.

The earliest poems which are with definite certainty ascribed to Vergil are the *Eclogues* or *Bucolics,* written probably between 43 and 37 B. C. There are ten of these, and they are in the main pastoral in character, although only five are strictly pastoral, dealing with the life of shepherds. While these *Eclogues* are based largely on the *Idylls* of Theocritus, Vergil succeeded in imparting to them a distinctly Roman tone. The *Georgics* consist of four books on agricultural subjects, dealing respectively with the tilling of the soil, the cultivation of fruit trees, the raising of cattle and horses and with beekeeping. Because of his deep interest in rural life and his practical knowledge of it, Vergil was well fitted to write upon these themes, and he presents them in an attractive and interesting manner. The work is the most finished of all Vergil's poetry, and has, in fact, been called the most finished of all poems.

Nevertheless, the *Aeneid* stands as the masterpiece of Vergil and as one of the masterpieces of the world. Modeled as it is on the *Iliad* and the *Odyssey,* it falls below these great poems in certain respects, notably in the presentation of dramatic scenes. And yet it is a noble conception, full of religious and patriotic ideals; and in Dido it gives one real, living character to the gallery of men and women in fiction. In its metrical beauty the poem has few rivals and probably no superiors. The earliest and one of the favorite verse translations is that of Dryden.

The writings of Vergil are an important part of every Latin course in the high schools, nearly always constituting all of the work of the fourth year in that language. A.MC C.

Consult Duff's *A Literary History of Rome;* Sellar's *Roman Poets of the Augustan Age: Vergil.*

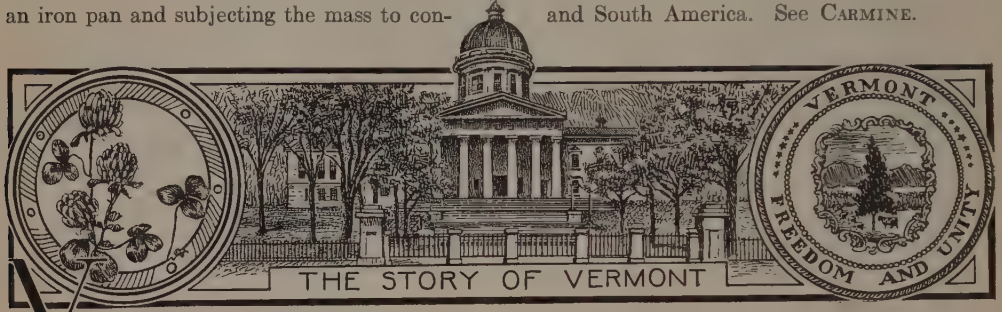
**Related Subjects.** The following articles in these volumes will explain the references in the above discussion of Vergil, and will give added information:

Aeneid
Augustus
Epic
Iliad
Odyssey

**VERMES,** *vur'meez,* an extensive division of the animal kingdom, including worms. See WORMS.

**VER'MIFORM APPEN'DIX.** See APPENDICITIS.

**VERMILION,** *ver mil'yun,* a permanent red pigment of brilliant color, widely used in the manufacture of paint. It is manufactured by grinding mercury and sulphur together and treating the mixture with caustic potash solution, or by heating mercury and sulphur in an iron pan and subjecting the mass to constant stirring. As a result of the latter process a black sulphide forms. This sulphide when vaporized in clay retorts yields the red pigment. In both processes it is necessary to grind, wash and dry the product. Imitation vermilions are made by coloring chalk with coal-tar dyes. Cinnabar, or native mercuric sulphide, is also known as vermilion. The name is derived from a Latin word meaning *little worm,* and refers to the insect from which carmine is obtained—the tiny cochineal insect of Central and South America. See CARMINE.




**VERMONT',** a New England state, popularly known as THE GREEN MOUNTAIN STATE. It is named for its evergreen-clad mountains which are said to have been first called *les verts monts,* meaning *the green mountains,* by Champlain when he saw their forested summits from the lake which bears his name. The state flower is the red clover.

**Size and Location.** Vermont is the only state of the New England group which has no sea coast, but for more than one hundred miles its western boundary follows the shores of Lake Champlain, more than half of which lies within the state; and the entire length of the state on the east is bordered by the Connecticut River, the longest river of New England. Having an area of 9,564 square miles, of which 440 square miles are water surface, Vermont ranks forty-second in size among the states of the Union. Its area only slightly exceeds that of New Hampshire and is about one-third of that of New Brunswick.

**The People.** Vermont had in 1910 the same rank in population among the states as it has in area; since then Idaho and New Mexico have become more populous. In 1910, the population was 355,956, the average density being thirty-nine per square mile. On January 1, 1917, the population was estimated at 364,322. Of the foreign-born citizens, numbering about 50,000, over one-half are Canadians, the majority of them French-speaking. A little over half of the population is rural. The largest cities are Burlington, Rutland, Barre, Montpelier, the capital, and Saint Albans, but the villages of Saint Johnsbury and Brattleboro are both larger than Saint Albans. Owing to the proximity of the old French province of Quebec and the large number of French-Canadians in the state, the Roman Catholics are most numerous among the religious denominations. Other Churches of importance are the Congregational, Methodist, Baptist and Episcopal, ranking in the order named.

**Education.** The public schools of Vermont are organized in a township system administered by town superintendents of education under the supervision of the state superintendent of public instruction. Education is compulsory twenty-six weeks of the year for all from eight to fifteen years of age. The illiteracy in the state, being 3.7 per cent, is less than that of any other Eastern state. The school fund is derived from state and local taxation; normal schools at Randolph, Castleton and Johnson and the University of Vermont and the state agricultural college at Burlington are maintained by the state. Middlebury College at Middlebury and Norwich University at Northfield, the other institutions of higher education, receive state aid and inspection.

In 1912, an educational commission, acting in coöperation with the Carnegie Foundation for the Advancement of Teaching, was created by the governor. In 1914 this commission reported upon the educational affairs of the state,

making sensational criticism of the institutions of higher education and arousing wide interest. In 1915, upon the recommendation of the commission, a new code was adopted providing for public supervision over all state funds, inspection of all institutions receiving state aid and approval of their expenditures. The same sums as were formerly donated were given to Middlebury College and Norwich University, and the appropriation for the University of Vermont was increased by $6,500.

There is no state board of charities, charitable and penal institutions being controlled by separate boards of directors under the general supervision of a board of visitors, consisting of the governor, lieutenant governor, speaker of the house of representatives and a woman appointed by the governor. State institutions are a home of correction at Rutland, a soldier's home at Bennington, a state sanitarium at Pittsford, an industrial school at Vergennes, hospitals for the insane at Brattleboro and Waterbury, and a state prison at Windsor. The deaf, dumb, blind and feebleminded are cared for at the state's expense in institutions in Massachusetts and Connecticut. In 1915 a law was passed making the education of the blind compulsory. Vermont is conspicuous in the use of the honor system in the state penitentiary, and under this system prisoners are employed outside of the jail.

**The Land.** Vermont is a section of the New England upland, broken by fir-clad mountain ranges, cut by deep valleys and swift, clear streams and studded with sparkling mountain lakes. The Green Mountains extend nearly through the state, from north to south, a little west of the center of the state, the loftiest of their rounded peaks being Mount Mansfield, Killington Peak, Camel's Hump, Mount Lincoln and Jay Peak, all having elevations of over 4,000 feet. Mount Mansfield, the tallest, is 4,364 feet high. Along the east shore of Lake Champlain are low foothills at the base of the Green Mountains. In the eastern part of the state is a low range called the Granite Mountains, in which Mount Ascutney rises 3,320 feet abruptly above the Connecticut Valley. Along the shores of Lake Champlain the land is lower than elsewhere in the state, the elevation being but 110 feet above sea level. Grand Isle, Isle La Motte and the Hero Islands in upper Lake Champlain are the largest islands belonging to Vermont.

**Rivers and Lakes.** Swift rivers, foaming through rocky gorges, falling over granite ledges or flowing between wooded banks in fertile valleys, form three drainage systems finding outlets to the sea. The eastern section of the state is drained by the Connecticut, flowing into Long Island Sound, and its tributaries, the Deerfield, West, Waits, Williams, Passumpsic, Ottaquachee, White and Nulhegan rivers. In the north, the Black River and the Barton River flow into Lake Memphremagog, thence into the Saint Lawrence. The only rivers in the interior at all navigable are the Missisquoi, Lamoille, Winooski and Otter Creek,

OUTLINE MAP OF VERMONT

Showing boundaries, principal rivers, leading cities, quarrying centers, and the highest point of land in the state.

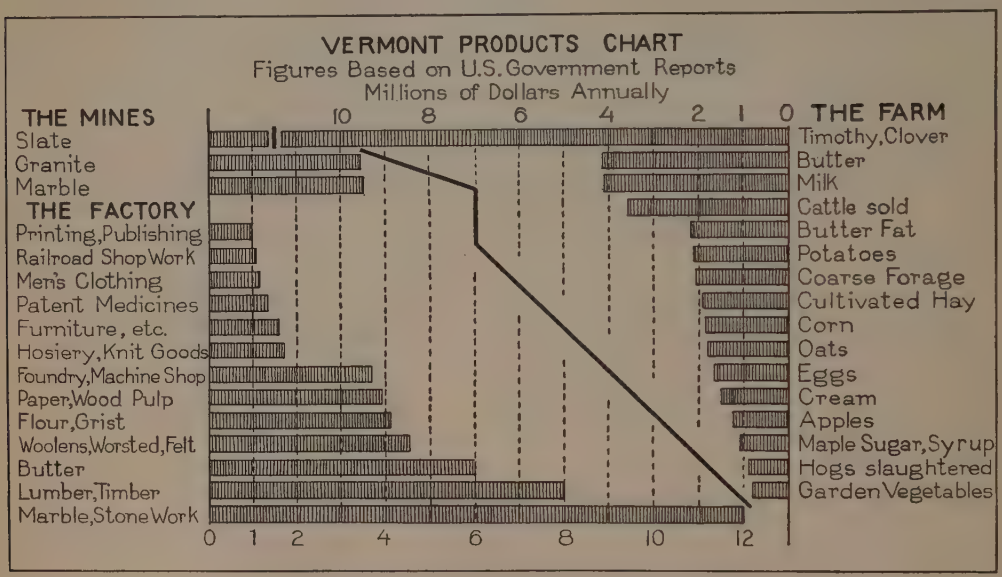
draining into Lake Champlain. Most of the streams of the southwest section are small.

The greater part of Lake Champlain, the largest lake of New England, lies in Vermont. On the northern border of the state is beautiful Lake Memphremagog, lying between the rugged projections of Owl's Head and Jay Peak on the west and rolling farm country on the east. Willoughby Lake, in the south, and Bomoseen, Saint Catherine and Dunmore, in the Champlain valley, are other large, picturesque lakes. The crystal waters of these and many smaller lakes abound with pike, pickerel, perch and bass, and their shores are bordered by many summer colonies.

**Climate.** The long, snowy New England winters are characteristic of Vermont, where in the mountains the cold is often severe. The average January temperature is 17°, and the mean snowfall, ninety inches. The summers are cool, and the temperature in all sections is subject to sudden changes. The average temperature for July is 68°. The rainfall is heaviest in the southern part of the state and during the summer months. The clear, pure air, the invigorating freshness of the cool summers and the beautiful scenery of the woods and mountains have made the state very popular as a summer resort.

ing the Morgan, Messenger and Black Hawk stocks.

**Forests.** The woodland area or Vermont is very extensive. The virgin growth of pine has been nearly exhausted, but spruce and hemlock are abundant. The state is famous for its sugar maples; and is the chief source of the maple sugar used in the United States. The maple syrup and sugar products of the state are valued at over a million dollars a year. In 1915, the legislature authorized cities and towns to buy land for forestry purposes. Tracts of over forty acres are under the supervision of the state forester. The Federal government

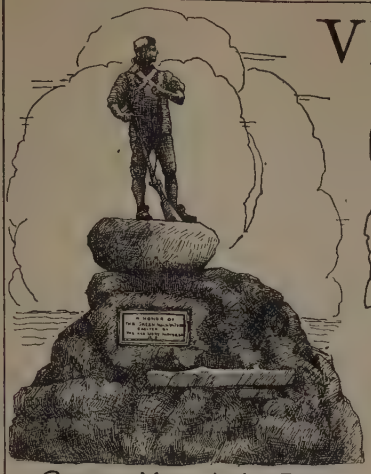



**Agriculture.** Every uncultivated hill, valley and plain of Vermont is a meadow or woodland, and only the highest regions are stony and sterile. About four-fifths of the area is farm land, the best agricultural sections being in the valley of Lake Champlain. Although Vermont's agricultural products are small when compared with those of the Central and Western states, they are of importance among the states of New England. In 1914 Vermont ranked thirty-seventh among the states in the value of crops. Hay gives over half the value; of the other crops potatoes are the largest, followed by corn, oats, apples and miscellaneous vegetables. Dairying is the most important branch of agriculture, and in the quantity of butter produced in proportion to the farm area and population, Vermont leads all of the states. The Green Mountain State is famous for the breeding of fine racing horses, includ-

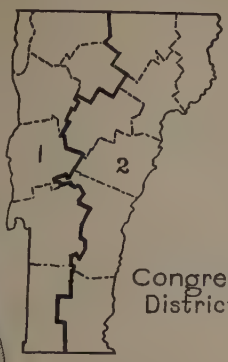
coöperates with the state in systematic protection from forest fires, and there is also an organization of private timberland owners for the same purpose.

**Minerals.** No other state of the Union quarries as much granite and marble as does Vermont. All known kinds of granite except red varieties are found in the state, including a very fine white variety and a green syenite known as "Windsor green granite." The largest quarries are near Barre, which is the center of the industry. Vermont's annual output of granite is valued at over $3,000,000, and is fifteen per cent or more of the total supply of the United States. The Green Mountain State also produces nearly one-half of the marble used in the United States. The largest quarries are in Bennington, Rutland and Addison counties, but fine-grained white, red, yellow, pink, green and blue marbles are found gen-

# VERMONT



Green Mountain Boy Memorial, Rutland

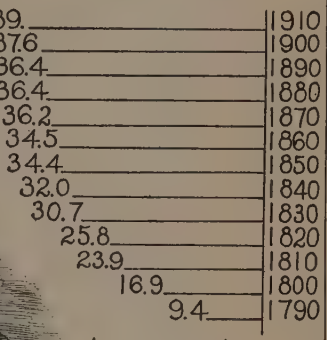



Congressional Districts

Bennington Battle Monument

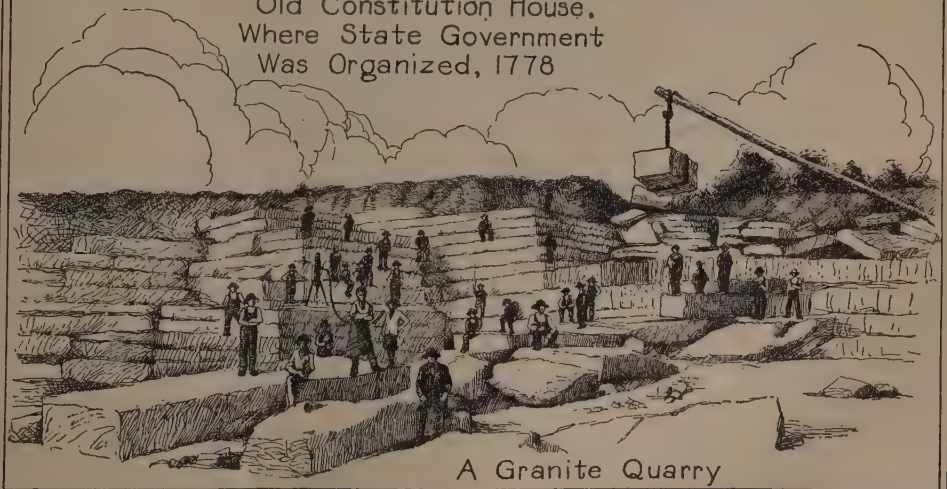
Vermont Cent, 1785
(obverse) (reverse)

Religions




Increase in Population Per Square Mile By Decades

Old Constitution House, Where State Government Was Organized, 1778



A Granite Quarry

erally throughout the western part of the state. The first quarry was established at Dorset in 1785. About eighty per cent of the marble used in monumental work is furnished by this state, and among the prominent buildings in the United States constructed of Vermont marble are the Harvard Medical School and the office building of the United States Senate. Vermont's yearly output of marble is valued at about $3,500,000.

Quarries in the eastern hills produce quantities of green and purple slate, used in roofing; Vermont yields nearly all the roofing slate of the United States that does not come from Pennsylvania. Soapstone, limestone, talc, asbestos, copper, ocher and kaolin are other mineral products, and small amounts of gold and silver have been found. The total mineral output is valued each year at about $9,000,000.

**Manufactures.** With the utilization of the power furnished by mountain streams, Vermont's manufacturing industries are growing in importance. The quarries of the state furnish material for the chief industry, the cutting and finishing of marble and stone. Logging and the rafting of lumber on Lake Champlain was the earliest industry of importance, and Burlington became a great lumber center. Most of the sawmills are run by water wheels; those of Bellows Falls and other Eastern cities are run by the waters of the Connecticut River. Among the lumber products wood pulp and furniture are of most importance. There has been a great increase in the dairy industries, and Vermont is now among the leading states in the making of cheese and butter. The state was one of the last in New England to develop textile manufacturing, and the output of cotton and woolen goods is relatively small. Saint Johnsbury is famous for the manufacture of scales. The first platform scale was invented and manufactured here by the Fairbanks Scale Company, now one of the largest scale manufacturers in the world. Flour and grist milling, foundry and machine shop work and the manufacture of slate roofing are other important industries. Burlington is the chief manufacturing city. In 1910 Vermont ranked thirty-eighth among the manufacturing states; the gross value of its products, as reported by the census of 1914, was $76,811,000.

**Transportation.** Vermont has good railroad service and excellent facilities for water transportation. Railroads running north and south along the east and west borders of the state make connection with lines to Boston and to New York, and in the north with Saint Johns and Montreal lines. Between these roads there are many parallel lines crossing the state diagonally, giving the railroad map roughly the appearance of a gridiron. In 1914 there were 1,073 miles of railroad and 124 miles of electric track in the state, together affording accommodations in every county and city. The principal roads are the Boston & Maine, Saint Johnsbury & Lake Champlain, Central of Vermont (Grand Trunk) and the Rutland, of the New York Central system. In 1915 safety laws regulating railroad crossings were passed by the state.

Lake Champlain is the great highway for the water traffic of the state. The Champlain Canal at Troy, New York, affords passage from the lake down the Hudson to New York harbor. By way of the Richelieu River and the Saint Lawrence, traffic from lake ports reaches Canadian markets. Otter Creek is the only river of commercial importance. Burlington is the port of entry for the Vermont customs district.

In 1914, 200 miles of state and state-aid roads were built; in 1915 3,278 miles, or 22.7 per cent of all public roads, were surfaced—a high average when compared with many other states.

## *Government and History*

**Government.** Vermont has had three constitutions, adopted in 1777, 1786 and 1793. The government of the state is generally more democratic than that of the other New England states. Originally the constitution was revised by a council of censors, but since 1880 the senate has been authorized to propose amendments every ten years. If these are approved by a majority in the house of representatives they are published in the newspapers, and if again approved by a majority in each house of the succeeding legislature they are then submitted to the people. If favored by a majority of the voters, the amendments are adopted. Suffrage is extended to all male citizens residing in the state one year. Women have the right to vote in school elections, and they may hold positions on school boards.

The *legislative department* consists of a senate of thirty members and a house of representatives of 245 members, elected and meeting biennially. The senators are apportioned ac-

cording to population, each county having at least one senator. Each township sends one member to the house of representatives.

The *executive power* is vested in a governor, lieutenant-governor, secretary of state, treasurer and auditor, elected by the people for two years. The superintendent of public instruction and various commissioners are appointed by the governor or are elected by the general assembly biennially. The governor's powers of appointment and pardon are limited, and his veto may be overridden by a majority vote in the assembly.

The *judicial department* consists of a supreme court, a court of chancery, county and probate courts and justices of the peace. The supreme court has seven justices, elected for two years by the general assembly, and it meets in each county and in a general session once a year. Other judges are elected by the people. There are fourteen counties, and local government is vested chiefly in the county courts and township officials.

There is local option and high license for the sale of liquor. Standard health and accident laws, workmen's compensation acts and child-labor laws have been passed. Labor disputes are settled by a state board of arbitration. In 1915 statewide primary laws were adopted, making Vermont one of the forty-two direct primary states.

**Settlement.** Probably the first white man to enter Vermont was Champlain, who established the French claim to the territory. A fort was built on the Isle La Motte, and French trading posts were established along the shores of Upper Lake Champlain. In 1690, an English settlement was made at Chimney Point, but the first permanent white settlement was not made until 1764, when Massachusetts established a settlement at Fort Dummer, in the present town of Brattleboro. During the French and Indian Wars this frontier territory was the scene of numerous Indian attacks and French and English expeditions.

A dispute arose between New Hampshire and New York concerning their respective boundaries in the territory of Vermont. From 1761 to 1763 the governor of New Hampshire issued 108 grants of settlements, and the territory became known as the *Hampshire Grants*. New York claimed this territory east to the Connecticut River, and in 1764 England recognized New York's claims. Thereupon New York ordered the settlers to surrender the land granted by New Hampshire and repurchase it from the colony of New York. Under Ethan Allen, Seth Warner and Remember Baker, the settlers took up arms to defend their rights, and they organized in 1771 a military force known throughout the colonies as the "Green Mountain Boys."

During the Revolution these Vermont troops distinguished themselves in many brave and successful encounters with the Indians and English, including a prominent part in the capture of Fort Ticonderoga and the Canadian expedition. Fresh from defeat at Hubbardton, the Vermont troops under Warner arrived just in time to save the day for the American troops at Bennington, where Burgoyne's series of victories was checked and the tide of the war was turned.

In January, 1777, the settlers of Vermont declared their independence and adopted "New Connecticut" as the name of their state. In July, the name was changed to Vermont, and a constitution was adopted containing a clause providing for the abolition of slavery; Vermont was the first state to make such a provision. In 1782 the present boundary with New Hampshire was fixed, and in 1790 New York's claims were abandoned.

**Statehood.** Vermont, for fourteen years an independent state, was not recognized by Congress until March 4, 1791, when it was admitted as the fourteenth state of the Union. During the War of 1812 Vermont troops took a prominent part in the battles at Plattsburg, Chippewa and Lundy's Lane. In the War of Secession the state supported the Union with its full quota of troops. Admirals George Dewey and Charles E. Clark, commander of the *Oregon,* were noted Vermonters. The state has been Republican since the formation of that party in 1856.

**Other Items of Interest.** Dwellers in Orleans County, Vermont, still tell of their "runaway" pond. This was a body of water two miles long and about a half mile wide, which was called Long Pond. It discharged to the south, but a short distance north of it lay another pond which emptied by a rapid stream into Memphremagog. The miller whose gristmill was turned by this little stream was much inconvenienced because at times the flow of water was not great enough to turn his wheel, and a plan was made to "tap" Long Pond and send a part of its waters to the north. A ditch was cut, but almost immediately the water began to rush through it with such force that the sides were washed away, the bed of the channel

# *RESEARCH QUESTIONS ON VERMONT*

**(An Outline suitable for Vermont will be found with the article "State.")**

What are "les verts monts," and who gave them that name?

What is the connection between the popular name of the state and its proper name?

What is the largest lake in New England? What is its area, and for what is it historically important?

What is the railway mileage of the state to each hundred square miles of area? How does Vermont compare in this respect with the states upon which it borders?

How many states besides the original thirteen were members of the Union when Vermont was admitted?

What famous naval leader was a native of this state? For what was he chiefly noted?

How does Vermont differ in its boundaries from all the other New England states? What compensation has it for this lack?

How many states of the Union are larger than Vermont? How many of these larger states have a greater population?

What advantages has the state that have made it a popular summer resort?

Trace on the map two water routes by means of which traffic from Vermont can reach the Atlantic.

How does the state compare in number of inhabitants to the square mile with the states on which it borders?

How does it compare in this respect with the United States as a whole? With the Canadian province which it touches?

How do you account for the fact that Roman Catholics are more numerous in the state than Protestants?

What distinction has Vermont among the states in respect to amount of butter produced?

How long has the state had its present constitution? How many had it had before the adoption of this one?

What industrial legislation passed by Vermont shows the progressive character of the state?

What proportion of the year must each child go to school?

What distinction has Vermont among the states with respect to its illiteracy statistics? How does it compare in this respect with the country as a whole?

What delicacy much liked by children is produced in greater quantity here than in any other state?

Why was it natural that this region should have been the scene of much fighting during the French and Indian Wars?

What unusual step did the state take toward bringing its higher educational institutions up to a standard?

What important building materials does this state produce in greater quantity than any other?

Why was this territory at one time known as the *Hampshire Grants?*

Who were the "Green Mountain Boys," for what were they noted, and who was their most famous leader?

How does the highest peak in Vermont compare in altitude with the loftiest point in each of its boundary states?

was dug out, and a raging torrent dashed away to the north. The miller's family was saved with difficulty. In six hours practically all the water of Long Pond had found its way to Memphremagog.

Burlington is commonly known as "the Queen City of Vermont."

Many of the fences of Vermont are constructed of stone, rather than of wood or wire.

Vermont actually "bought itself" from New York, paying for its territory about $30,000.

This state has a smaller proportion of city dwellers than any other New England state, considerably less than half of its population living in towns of 2,500 or more.

A real and very profitable industry of Vermont, especially in those towns which are situated in the mountains or on the shore of a lake, is the entertainment of boarders during the summer months. E.B.P.

Consult Collins's *History of Vermont;* Conant's *Geography, History, Constitution and Civil Government of Vermont.*

**Related Subjects.** The reader who is interested in Vermont may consult the following articles in these volumes:

CITIES AND TOWNS

Barre
Bennington
Burlington
Montpelier
Rutland

HISTORY

Allen, Ethan
Champlain, Samuel de
Green Mountain Boys
Ticonderoga, Battles of

LEADING PRODUCTS

Butter
Cheese
Granite
Lumber
Marble
Slate
Sugar, subhead *Maple Sugar*

PHYSICAL FEATURES

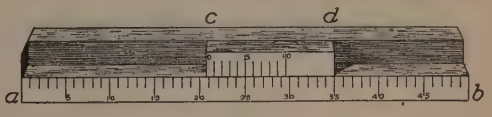
Champlain (lake)
Connecticut River
Green Mountains
Memphremagog
Taconic Mountains

**VERMONT,** UNIVERSITY OF, a coeducational institution, established at Burlington in 1791 by act of the state legislature. In 1865 the Vermont Agricultural College was incorporated with the older institution, and the organization became a beneficiary of the land-grant act of 1862. The legal title of the institution is University of Vermont and State Agricultural College. This institution is organized into colleges of arts and science, engineering, agriculture and medicine. The curriculum of the college of arts and science includes courses in home economics, educational commerce and economics. Male students are required to study military theory and to drill. The university is generous in the matter of scholarships and prizes and in advancing loans to students of limited means. Vermont University has a beautiful campus overlooking Lake Champlain. The regular attendance is over 1,000, and the faculty numbers about 118. There is a library of 95,000 volumes.

**VERNE,** JULES (1828-1905), a French writer of fiction, born at Nantes. Though trained for the law, he found a greater interest in the literary profession, and after making unsuccessful attempts at play-writing began the production of tales of adventure in which the possibilities of modern science are treated in an exaggerated manner. These stories have become remarkably popular, particularly with boys, and it is noteworthy that some of the things which Verne created and which strained the credulity of his readers, as the airship, the submarine and the automobile, are now actual facts. Well known among his stories are *Twenty Thousand Leagues Under the Sea, Around the World in Eighty Days, The Mysterious Island* and *From the Earth to the Moon.*

JULES VERNE

**VERNIER,** *vur'ni er,* an instrument for measuring lengths and angles with great exactness. It is so called from its inventor, a French mathematician named Pierre Vernier (1580-1637). A vernier in common use is shown




VERNIER

in the illustration. It is a short, graduated scale, constructed to slide along a fixed scale, and having subdivisions each of which is nine-tenths as long as any of the subdivisions of the fixed scale. Nine small divisions on the scale are therefore equal to ten on the vernier. On adjusting the vernier, as shown in the figure, we find that the left end of the vernier is twenty scale divisions and a fraction to the right of the zero end of the scale, and that the line on the vernier which exactly coincides

with a scale division is the fifth one beyond the vernier zero. It is evident that the fourth vernier line beyond zero is one-tenth of a scale division from the fourth scale line beyond 20, that the third vernier line is two-tenths from the third scale line, the second vernier line is three-tenths, the first vernier line four-tenths, and the zero vernier five-tenths of a scale division to the right of the twentieth scale division. Then the vernier zero is exactly 20.5 scale divisions from the zero end of the fixed scale.

**VER'NON,** a city in the Yale district of British Columbia, in the southern part of the province. It is at the north end of the Okanagan Valley, five miles east of Okanagan Lake. It has railway connection, by a branch of the Canadian Pacific, with Sicamous, on the Canadian Pacific's main line, and with Okanagan Landing, whence the steamers go to Penticton, at the south end of the lake. Vernon is 109 miles north of Penticton, five miles northeast of Okanagan Landing and forty-six miles south of Sicamous.

Vernon was incorporated as a city in 1892, by 1901 had a population of 802, and by 1911 it had 2,671 people; in 1916 the number was estimated at 3,500. It owns and operates its water and lighting systems, and has two parks, Polson and Lake View. The provincial courthouse, completed in 1914 at a cost of $175,000, and the post office, completed a year earlier, are the most conspicuous structures. The city has numerous industrial plants, including a sawmill, sash-and-door factory, cigar factory, cannery and cider press, and is also the central supply point and largest settlement in the Okanagan district. The central fruit-selling agency for the valley is established there.

**VERONA,** *ve ro'na,* a walled and fortified city in the northern part of Italy, occupying both banks of the Adige River. It is picturesquely situated at the foot of a spur of the Tyrolese Alps, seventy-one miles by rail west of Venice. Among the cities of Venetia Venice alone surpasses it in fame and interest. In literary history it is celebrated as the reputed home of Romeo and Juliet, and the house in which Shakespeare's heroine is said to have lived is pointed out to credulous sightseers. During the Middle Ages Verona was an art center of first rank, and numbered among its native sons the great Paul Veronese.

In its general aspect the city presents a fascinating combination of ancient, medieval and modern civilizations. Most of the city lies on the right bank of the river, and on this side is the most important square, called the Piazza Vittorio Emmanuele. The chief point of interest in the square is the ruin of a magnificent Roman amphitheater, a structure built by the Emperor Diocletian, and still used occasionally. In the vicinity there is an old disused monastery, containing the reputed sarcophagus of Juliet.

Verona has a royal seminary, libraries, hospitals, and numerous charitable institutions. The industrial establishments include cotton, paper and flour mills, piano and organ factories, an arsenal and other military plants, a nail factory and manufactories of silk, soap and candles. There is an active trade in wine, fruits and marble. The city was a prosperous Roman colony before the beginning of the Christian Era, and was a royal residence under Theodoric the Great. During the War of the Nations Verona was several times bombarded by Austrian airships. Population in 1911, 81,909; in 1915, estimated, 86,448.

**VERONESE,** *va ro na'sa,* PAUL, or PAOLO (1528-1588), a contemporary of Titian and Tintoretto, and the last of the great Venetian masters. His real name was CALIARI (or CAGLIARI), but he was called Veronese, from Verona, the place of his birth. Most of his life was spent in Venice. Enjoying the pomp and festivity of that city, he loved best of all to paint banquet scenes. His compositions were rich in coloring and ornamental detail, and his execution was truthful; he was especially skilful in his methods of grouping. Whether he chose his themes from mythology, history or the Bible, Venetian architecture furnished his setting, and his figures were garbed in gorgeous robes. He often introduced parrots, dogs, horses and even buffoons into his religious pictures. The Venetians were particularly devoted to him and delighted to adorn their city with his works.

His most celebrated painting, *The Marriage at Cana of Galilee,* is one of the largest easel paintings in the world, and contains over 130 life-size figures, many of them portraits of contemporaries. Among his other notable canvases are *The Calling of Saint Andrew to the Apostleship, The Feast of Simon, Presenting of the Family of Darius to Alexander, Saint Helena's Vision of the Invention of the Cross* and *The Rape of Europa.*

**VERONICA,** *ve ron'i ka,* SAINT, a woman of Jerusalem, who, according to Roman Catholic legend, gave Jesus her headcloth to wipe His face as He passed her bearing His cross. This

He returned to her with a print of His face miraculously stamped upon it. The cloth possessed powers of healing, according to the story, and was taken by Veronica to Rome for the purpose of healing the Emperor Tiberius. It was bequeathed to Clement, the successor of Peter, and is said to be still in Saint Peter's, though two different Spanish cities also claim to have it in their possession. In the earliest form of the legend, which dates back to the eighth century, it is the cloth and not the woman that is known as Veronica; this name is probably from the words *vera icon,* meaning *true image.*

**VERRAZANO,** *ver raht sah' no,* GIOVANNI DA (about 1480-about 1527), an Italian navigator, chiefly famous for a voyage to America, soon after its discovery by Columbus. Concerning the details of his life but little is known with certainty, but he seems to have undertaken numerous trading trips to the Orient, and while in the service of France to have preyed upon Spanish shipping. It was in 1524 that his adventures led him to America. Touching at the coast of North Carolina, in the neighborhood of Cape Fear, he sailed southward for a time, and then northward, discovering a bay which may have been either New York or Narragansett. The sole authority for accounts of this voyage is a letter written by Verrazano to Francis I of France, but doubts have been raised as to the genuineness of the document. There is confusion, too, as to the later years of the navigator's life, but it seems probable that he was captured and hanged by the Spaniards.

**VERSAILLES,** in English, *ver saylz',* in French, *ver sah' y',* the former residence of the French court and present capital of the department of Seine-et-Oise, is a town in the northern part of France, twelve miles southwest of Paris. The principal feature of the place is the beautiful palace erected in 1661 by Louis XIV, and used as a royal residence until the time of Louis Philippe. The palace and the park surrounding it are described below. Versailles has a school of military engineering and artillery and is the seat of a bishopric. It is also a garrison town, but is not important industrially. During the siege of Paris in 1870-1871, the German army made Versailles its headquarters, and for a period after the war the town was the official capital of France. Population in 1911, 60,458.

**Palace of Versailles.** This is one of the most magnificent palaces in the world. It is said that Louis XIV spent over $100,000,000 on it and on the park beyond. The palace is three stories high, in form a great square, with a wing at either side and one in the back, projecting into the park. Above the center of the imposing façade, which is a quarter of a mile in length, are the words *À toutes les gloires de la France* ("To all the glories of France"). Within are shown the apartments of Louis XIV, with the furnishings much as they were in his day; the room in which Louis XV died; the chambers of Marie Antoinette, and the museum of art and history for which the palace is to-day chiefly noteworthy. Paintings and statuary show, as far as may be, the history of France from the days of Clovis, great galleries being devoted to the different historical epochs. Especially interesting are the rooms which represent the Crusades, wherein are contained armor of the period and modern paintings dealing with the Crusades.

The park, with its fountains, terraced gardens, lakes, avenues and formally clipped trees, is of much interest, though it is distinctly of the artificial rather than the natural type. The display when the fountains are running is beautiful, and attracts huge crowds of visitors. So great is the expense for such an exhibition, however, that it is usually not given oftener than once a month.

After its construction by Louis XIV, Versailles was the royal residence of several succeeding kings. Here were built the Grand and the Petit Trianon for the favorites of Louis XIV and Louis XV, and here lived Louis XVI and Marie Antoinette. The wasteful luxury of the life they led enraged the people of Paris, who in 1789 marched to the palace and compelled the king and queen to return with them to the city. The famous meeting of the States-General, with which the French Revolution really began, was held in the Palace of Versailles, which had also been the scene, seven years earlier, of the signing of the preliminary agreement at the close of the war between England and the American colonies. R.D.M.

Consult De Nolhac's *Versailles and the Trianon,* English translation (1912).

**VERTEBRATES,** *vur' te brayts,* or **VERTEBRATA,** *vur te bra' ta,* the highest branch of the animal kingdom, including all animals which possess backbones. The various groups comprising the vertebrate animals are mammals, birds, reptiles, amphibians and fish. The spinal column, or backbone, is made up of segments called vertebrae, to which are attached the ribs and the bones supporting the jointed

limbs. The ribs form an expansible box protecting the heart, lungs, stomach and other organs. In vertebrates the heart is always on the ventral side of the body. The body is symmetrical, its two sides being alike, or nearly so, and there are never more than two pairs of limbs. The digestive system consists of mouth, oesophagus, stomach and intestines, and there are various glands which secrete digestive fluids. In the majority of vertebrate animals the layers of the skin are soft, as in man, and are provided with hair, feathers, scales and nails for protection and ornament.

The doctrine of evolution (see EVOLUTION), established by Darwin in the middle of the nineteenth century, and the recent demonstrations that some of the lower animal forms, such as mollusks, possess at certain stages in their development the nerve cord, brain, spinal column and pharyngeal gill slits characteristic of the vertebrates, indicate that a rigid distinction between the lower animals and vertebrates is not possible.

Consult Lucas's *Animals of the Past;* Reynolds' *The Vertebrate Skeleton.*

**Related Subjects.** The reader who wishes to make a systematic study of the vertebrates will find all those treated in these volumes classified under the following headings:

| | |
|---|---|
| Amphibians | Marsupials |
| Bird | Primates |
| Carnivorous Animals | Reptiles |
| Cetacea | Rodents |
| Fish | Ungulates |
| Mammals | |

**VERTIGO,** *vur'ti go,* the condition popularly known as *dizziness.* The victim of vertigo has the feeling that objects before him are whirling about or that he himself is falling. If he attempts to walk he staggers or falls down. There are various causes for this distressing sensation, including excessive or defective supply of blood to the brain, and variations in the pressure of the fluid in the semicircular canals of the internal ear (see EAR, subhead *Semicircular Canals*). Vertigo is often an accompaniment of anaemia, epilepsy, heart trouble and indigestion. Many people become dizzy by whirling themselves around rapidly several times, and some cannot look down from the top of a high building without experiencing the sensation. Any serious attack of vertigo should be reported to the family physician. C.B.B.

**VESPASIAN,** *ves pa'zhi an,* TITUS FLAVIUS VESPASIANUS (A.D. 9-79), a Roman emperor, from A.D. 70 to 79. He served as quaestor, aedile and praetor, and as commander of a legion won distinction in Britain. In 51 he was elected consul, in 63 became governor of Africa, and in 66 was placed in command of the Roman forces in the Jewish war. Before this was brought to a conclusion news arrived of Galba's death, and Vespasian's soldiers proclaimed him

A COIN OF THE REIGN OF VESPASIAN

emperor. Otho and Vitellius had been put forward by rival factions, but Vespasian's supporters were at length victorious, and in 70 he entered Rome as sole ruler of the empire.

Improvements were at once instituted in the administration of the law, and the country, torn with civil wars, became once more prosperous. On the capture of Jerusalem by Titus, father and son shared in a splendid triumph, in commemoration of which the Arch of Titus was built, and throughout the rest of Vespasian's reign there was peace. The great Colosseum was begun by Vespasian and finished by his son Titus.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Colosseum | Quaestor |
| Consul | Rome |
| Praetor | Titus |

**VESPUCIUS,** *ves pu'shi us,* AMERICUS (1452-1512), also known as AMERIGO VESPUCCI, *ves poot'che,* was a famous Italian explorer, the actual discoverer of the continent of America. He made no attempt to rob his friend Christopher Columbus of the honor of the discovery of a new world, but after Vespucius, however, America was named. He was born in Florence, was educated by his uncle, a Dominican, and in some way managed to gain an unusual knowledge of astronomy, a subject which strongly appealed to him. After being

AMERICUS VESPUCIUS

engaged for a time in trade, at first in his native city and later in Cadiz, Spain, he became connected with a firm which fitted out vessels for long voyages, and Vespucius himself doubtless had a part in fitting out the second expedition of Columbus (1493).

As to the voyages of Vespucius himself, there is much uncertainty. The only contemporary account of them was given in his letters, but the originals of these have been lost, and existing translations are far from clear. That there

THE COAST HE EXPLORED

The black area bordering on the Atlantic represents the supposed extent of the explorations of Vespucius.

were four voyages, in 1497, 1499, 1501 and 1503, respectively, the first two undertaken for Spain, the latter two for Portugal, seems certain; but there is not definite knowledge as to the countries visited. Probably the first expedition reached the coast of South America or of Central America, a few days before Cabot reached North America, and at least a year before Columbus reached the mainland of South America. In the three later voyages various parts of the coast of South America seem to have been explored. In none of these expeditions did Vespucius take the leading part; he was probably pilot, or "astronomer."

In 1507 there was published by Waldseemüller a translation of the letters of Vespucius, and in this work appeared the first suggestion that the name *America* be given to the newly discovered continent, "because Americus discovered it." Gradually the title became widely accepted, at first for South America, but later for the whole western hemisphere. A.MC C.

Consult Harrisse's *Discovery of North America;* Lester's *Life of Americus Vespucius.*

**VES'TA,** who occupied a distinguished place among the divinities of the Romans, was the goddess of the hearth. It was her province to watch over domestic life, and she had her shrine in the inner part of every house. Her temple, circular in form, was situated in the center of Rome. Here she was worshiped under the symbol of the eternal fire, watched over by the six Vestal virgins. Their most important duty was to keep this sacred fire burning, for were it permitted to be extinguished a national calamity might be looked for. The home of these virgins, situated near the temple, was large and magnificent. In Vesta's temple were preserved the highly prized Palladium of Troy and the six other mystic symbols of the welfare of the city. Every community had its hearth where a fire was constantly burned in her honor, and colonists, upon leaving the city, took with them some of the old fire to kindle a flame in their new home. The great festival in honor of the goddess, called the Vestalia, was celebrated on the ninth of June. Few legends are associated with Vesta.

**VESUVIUS,** *ve su' vi us,* the most widely-known volcano in the world, is situated on the Bay of Naples, about ten miles southeast of the city of Naples (see illustration, page 4061). The mountain has two summits, the higher one of which, Vesuvius proper, is the cone from which the volcano pours out its streams of lava. Mount Somma, the lower summit, partly encloses the active cone. The circumference of the base of the volcano is about thirty miles in extent, and the active cone is about 4,000 feet above sea level. Somma has an altitude of 3,730 feet.

At the top of the active cone is a cup-shaped crater, varying in diameter from 50 to 400 feet. Within this there is always more or less activity. Columns of steam, cinders and, occasionally, small quantities of lava are being thrown into the air. Under the direction of a guide visitors may descend into the crater for some distance, but the presence of poisonous gases makes the descent dangerous to those who do not know how to avoid them. An electric railway takes passengers from Naples to within 450 feet of the crater, and Vesuvius is visited by thousands of tourists every year. The mountain can also be ascended on foot, on horseback and by a cable railway, which hauls one car up as another goes down. The plains at the foot of the mountain and its lower slopes are densely populated and are laid out in vineyards, which are in a high state of cultivation. The upper slopes of the mountain and the summit are uneven and are covered with loose fragments of lava and volcanic ash.

The first recorded eruption of Vesuvius occurred in A.D. 79, when the cities of Hercu-

laneum and Pompeii were destroyed. Since the year 79 eruptions of more or less violence have taken place at varying intervals. In 472 ashes poured from the crater in such quantities that they were carried as far as Constantinople. Streams of lava and boiling water fell upon the villages at the foot of the mountain in a violent outburst, in the year 1631, and there were destructive eruptions in 1794, 1822, 1855 and 1872. The greatest loss of life within recent years occurred in 1906, when several towns and villages in the vicinity were destroyed.

Vesuvius is the only active volcano on the continent of Europe. As it is in a state of constant activity and easy of access, it has been studied by scientists more than any other volcano, and upon its slopes an observatory has been erected. Upon these studies many of the theories concerning volcanic activity are founded.

Consult Shaler's *Aspects of the Earth;* Lacroix's *Eruption of Vesuvius.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Herculaneum | Pompeii |
| Naples | Volcano |

**VETCH,** a group of climbing herbs native to Europe, Western Asia, Northern Africa and America, and cultivated since early Roman times as a forage plant. In the United States the best species for forage purposes is the *hairy vetch,* which yields from two to four tons of hay per acre; but in Europe, *spring vetch,* or *tare,* is most commonly raised. The plant has compound leaves composed of twenty or thirty oval leaflets, and bears clusters of bluish-pink or purple flowers.

**VETERINARY,** *vet'erinari,* **MED'ICINE,** that branch of medical science which deals with the nature, causes and treatment of diseases of domestic animals, especially of horses and cattle. The veterinarian must possess a thorough knowledge of the anatomy of domestic animals, and must be familiar with their habits and know the conditions necessary to keep them in a state of health. To this knowledge must be added that of the various diseases to which the animals are subject and the best methods of treating them. He must also be a keen observer, for he must judge of the animal's condition from observation alone.

Veterinary medicine is closely related to human medicine, and in its development has kept pace with the chief branch of medical science. In all states veterinarians are required to possess a diploma showing their graduation from a veterinary college of recognized standing, or to pass a rigid examination before they are allowed to practice. Schools of veterinary medicine are maintained in most of the state agricultural colleges and in a number of the leading universities.

In Canada the Department of Agriculture maintains a fully-equipped veterinary service for the inspection of live stock, milk and meat. The United States Veterinary Medical Association has been very influential in raising the standard of the science in the United States.

One of the most valuable services rendered by veterinary science consists of the study and prevention of infectious diseases, such as anthrax, foot and mouth disease and rinderpest. (Each of these is described in these volumes under its title.) The United States Department of Agriculture and state authorities also aid in this work, and include in it the inspection of milk and meats. The Department of Agriculture, through the Bureau of Animal Industry, issues bulletins on the most damaging diseases of domestic animals, and these may be procured by writing for them. See DISEASE, subtitle *Diseases of Animals.* W.F.R.

Consult Schmidt's *The Veterinary Adviser.*

**VE'TO,** from the Latin *veto,* meaning *I forbid,* is the power given to the chief executive of a country, state, province or city, to negative either temporarily or permanently any law passed by its legislative department. The veto may be either *absolute,* from which there can be no appeal, or *limited;* in the latter case the body which originally passed the law may later declare it effective, regardless of executive disapproval.

The veto is not known to all governments. In England the veto of the ruler is absolute, but no king or queen of Great Britain has exercised this power since 1708. In France the veto simply suspends a law until it may be repassed in the legislature by an ordinary majority. In the United States the veto of the President is limited, as his objections may be overruled by a later vote of the Congress.

No law of the United States can become effective until signed by the President, or held by him ten days without action, unless it be passed again by Congress over his veto. In vetoing a bill the President merely returns it without his approval to the house in which the bill originated; the written statement of his reason for withholding approval is the veto.

If the two houses of Congress believe that the President's position is unwise they may

vote again upon the measure. If on this second veto two-thirds of each house favors the passage of the law, it then becomes an act of Congress without further reference to the President. In this connection it should be emphasized that this two-thirds vote does not mean two-thirds of the members of each house who are present and voting, but two-thirds of the entire membership of the Senate and House of Representatives. This provision makes it more difficult to override the Presidential objection. On the original passage of any bill a majority vote only is required.

If the President of the United States fails to sign or to veto any bill within ten days (excluding Sundays) after it has been presented to him, the bill becomes a law without action by him. There is a single important exception to this rule: if Congress adjourns before the end of the ten days the President need not express his opinion of the bill, but may pay no attention to it. This is called a *pocket veto,* presumably because the President, if he feels inclined, may put the bill in his pocket and ignore it. The object of this clause of the Constitution (Art. I, Sec. VII, Par. 2) is to protect the President from a possible flood of bills in the closing days of a session of Congress. Cleveland, more than any other President, used this method of killing legislation of which he disapproved.

In the states of the American Union the veto power is vested in the governor, and he may nullify any act of the state legislature. Such an act, however, may be passed again over the veto by a vote of either a majority or two-thirds of the membership of each house. In cities, following the example of the nation and the state, the mayor holds the veto power over ordinances, which, however, may be repassed over his objection.

**In the Dominion of Canada.** The British North America Act provides that copies of all laws passed by the Canadian Parliament shall be sent by the Governor-General to London to the Secretary of State for the Colonies. There these laws are duly considered and at any time within two years may be vetoed in case they are found to conflict with the interests of the Empire. Such important acts are beyond the legitimate powers of Canada as a dependency. On his own initiative, except as he is advised by the Privy Council, the Governor-General may refuse his approval of any bill passed by the Parliament; this is called reserving bills; any bills thus reserved for the consideration of the Empire government, he forwards to the home office at once with a statement of the reasons for his action. W.F.Z.

Consult Mason's *The Veto Power.*

**VIADUCT,** *vi'a dukt,* a long bridge, consisting usually of a series of arches of masonry or spans of steel, carrying a roadway or railway tracks across a valley. The term is also often applied to the elevated roadways built in cities to relieve the congestion of streets. The viaduct is a special sort of bridge, which was first designed in America and the best types of which are still to be found there. The commonest kind consists of a series of rather short spans of steel or concrete supported by steel and concrete piers, which are braced in all directions.

The longest viaduct in the world is that which crosses the Kaw River valley, connecting Kansas City, Mo., and Kansas City, Kan. It has a total length of 8,400 feet. The viaduct at Des Moines, Iowa, is 2,685 feet long and has a maximum height of 185 feet. The Tunkhannock viaduct (see illustration, page 921), completed by the Lackawanna Railway in 1915, is the largest concrete viaduct in the world. It spans the valley of Tunkhannock Creek, at a distance of 240 feet above the stream. It has a length of 2,375 feet and consists of ten spans of 180 feet each and two of 100 feet each. The cost of this viaduct, including that of the smaller one over Martin's Creek, near by, was $12,000,000. Other notable viaducts are the Pecos River viaduct in Texas (see illustration, page 5773), the Kinzua on the Erie Railway, and the Gokteik, in Burma. See BRIDGE.

**VICAR,** *vik'er,* a person appointed to perform duties in place of another. In the Roman Catholic Church the Pope calls himself the Vicar of Christ on earth. He also has his vicars in the patriarchs, primates, archbishops and bishops, and they, in turn, have their substitutes, or vicars. The representative of a bishop is known as a *vicar-general.* In the Church of England a vicar is a clergyman in charge of a parish where the main tithes go to a rector, for whom he acts as deputy.

**VICENZA,** *ve chen'tsah,* a picturesque city of Italy, about forty miles northwest of Venice, and capital of the province of Vicenza. It is enclosed by a moat and walls, now almost in ruins. To the famous architect Palladio, a native of Vicenza, the city is indebted for many of its finest buildings, including the prefect's palace, the Olympic Theater and the Palazzo (Palace) della Ragione. The central

square, Piazza de' Signori, contains a campanile 270 feet high. The Duomo, a fine Gothic church dating from the thirteenth century, is enriched by many paintings of ancient masters. The leading educational institutions include an academy of sciences and arts, a technological school, a municipal museum and a library of 200,000 volumes. Silk, velvet, linen, earthenware and paper are the important articles of manufacture. The province of Vicenza, which extends to the Alpine ridges, dividing Italy from the Austrian Trentino in Tyrol, contains seven communes. Population of Vicenza (commune) in 1915, 57,016.

**VICE-PRESIDENT,** in the government of the United States, the person who succeeds the President, in case the latter, for any Constitutional reason, is permanently unable to fulfil the duties of his office; the prefix *vice* is from a Latin word meaning *in the place of.*

It is customary, outside of the American republic, to give a Vice-President power second only to that of the President, because his experience will be valuable if he is called on to assume the higher office. In the United States government, however, this condition does not exist. The Vice-President is elected at the same time and in the same manner as the President; he must have the same qualifications—must be a natural-born citizen, thirty-five years of age, and a resident of the United States for at least fourteen years; and he takes the oath of office in the Senate chamber on the same day and immediately after the inauguration of the President. But here the parallel ends, for the President wields great executive power and is the responsible head of the government; the Vice-President, instead of sharing his responsibilities and lightening his burden, has no duties except to preside over the sessions of the Senate. Not being a member of the Senate, he is not allowed to vote, except in case of a tie. His salary is $12,000 a year, whereas the President receives $75,000.

If there is a serious defect in the Executive Department of the United States government, many observers deem it to be the unimportance with which the office of Vice-President is viewed. He succeeds to the office of President if the latter dies, is removed from office or is permanently incapacitated from performing his duties. Yet the Vice-President has occasionally been a man whose succession to the Presidency would have been a calamity; very often his selection is due to political expediency, and not sufficient emphasis is laid upon fitness. Five Presidents—Tyler, Fillmore, Johnson, Arthur and Roosevelt—were elected Vice-Presidents and succeeded to the highest office in the United States through the death of the incumbent. W.F.Z.

**VICEROY,** *vyse'roy,* an official who rules a province or colony in the name of a sovereign. The name means, literally, *vice-king.* The official title of the chief executive of British India is *governor-general,* but he is usually called viceroy. This title is also frequently applied to the lord-lieutenant of Ireland.

**VICKSBURG,** *viks'burg,* Miss., the county seat of Warren County, was the third largest city in the state in 1910, but second in 1916, ranking next to Jackson. It is a busy port of the Mississippi River, the western state boundary, and is 236 miles north by west of New Orleans and forty-one miles west of Jackson. Vicksburg is located on high bluffs near the mouth of the Yazoo River, whose natural course was diverted through an old channel of the Mississippi in order to give the city its original water front. Steamboats make regular sailings to all of the important river towns, and railroad transportation is provided by the Alabama & Vicksburg, the Vicksburg, Shreveport & Pacific and the Yazoo & Mississippi Valley roads. The population was 20,814 in 1910 and 22,816 in 1916 (Federal estimate).

Vicksburg occupies a site seven square miles in extent, in the Walnut Hills. In 1862, when the city had been strongly fortified and garrisoned, it served as a fortress by which the Confederates were able to control the Mississippi River. Its surrender, after numerous sieges, on July 4, 1863, was one of the decisive defeats of the Confederacy in the War of Secession. North of the city is the National Cemetery, where lie buried 16,727 Federal soldiers, over twelve thousand of whom are unknown dead. The old battle ground is now the National Military Park, containing more than 1,200 acres. It is continuous with the cemetery and has many fine monuments and memorials.

Prominent features of the city are the Federal building, courthouse, city hall, public library and a number of fine old structures which survived the war. The leading institutions include Saint Aloysius Commercial College, Saint Francis Xavier's Academy, King's Daughters' Home, the State Charity Hospital, a sanitarium and an infirmary. Vicksburg is the commercial center of a richly productive cotton section, and has an extensive trade in

cotton and other produce. The timber resources are also important. The industrial establishments of the city include railroad shops, lumber mills, cotton compresses and cotton-seed-oil mills, foundries and manufactories of lumber products, molasses, confectionery, wagons and ice.

A French and a Spanish fort were built near the site of Vicksburg in the eighteenth century, but the first permanent settlement was made in 1811, on the plantations of William Vick and John Lane. The place was incorporated in 1840. M.W.

**VICTOR EMMANUEL II,** *vik'tor em man'u el* (1820-1878), king of Sardinia from 1849 to 1861, and king of Italy from 1861 until his death. Becoming involved in a struggle with Austria and thinking that his son could obtain better terms from that country, Charles Albert, his father, abdicated in his favor. Victor Emmanuel immediately surrounded himself with ministers and advisers who could help to promote the commercial greatness of the country. His celebrated and broad-minded minister Cavour assisted him to regulate and improve financial conditions, to reorganize the army and to secularize Church property. The latter brought upon Victor Emmanuel the displeasure of the Pope, and he was excommunicated, but he asserted his independence and refused to submit to Papal demands.

With the advice of Cavour, Sardinia joined England and France and sent 17,000 men to take part in the Crimean War. In 1859 war was declared by France against Austria, and the Austrians were disastrously defeated at Magenta and Solferino. Sardinia did not derive any of the expected benefits from this campaign, and Victor Emmanuel was compelled to yield Nice and Savoy to France.

In 1860 Tuscany, Parma and Modena were annexed to the dominions of Victor Emmanuel, Garibaldi turned over Sicily to the king, and Umbria, throwing off the authority of Pope Pius IX, was annexed to Italy. Victor Emmanuel was proclaimed king of Italy on March 17, 1861. In 1866 Venetia was ceded to Italy by Austria, and on the withdrawal of the French garrison from Rome in 1870 that city was annexed and became the capital of the country. On his death in 1878 Victor Emmanuel II was succeeded by his son Humbert I.

Consult Godkin's *Life of Victor Emmanuel II;* Holland's *Builders of United Italy.*

**Related Subjects.** The reader who is interested in the history of Italy during the period of Victor Emmanuel may consult the following articles in these volumes:

| | |
|---|---|
| Cavour, Count | Italy, subhead |
| Crimea, subhead | *Unification of Italy* |
| *Crimean War* | Sardinia, Kingdom of |
| Garibaldi, Giuseppe | Sicilies, Kingdom of |
| Humbert I | the Two |

**VICTOR EMMANUEL III** (1869- ), king of Italy, a just and generous ruler who has won the respect and confidence of his people. He is the only son of King Humbert I and Queen Margharita, was born at Naples and was called

EMMANUEL III

Prince of Naples until he succeeded his father as king in 1900. He has considerable knowledge of military affairs, having entered the army as second lieutenant and risen by merit to the rank of general. At the coronation of Nicholas II of Russia he was present as his father's representative, and occupied the same position at the jubilee celebrations of Queen Victoria of England. In 1896 he married Princess Helena, daughter of Prince Nicholas of Montenegro and sister of Princess Zorka, wife of Peter Karageorgevitch, who became king of Serbia in 1903.

The king of Italy is democratic and broad-minded; he is greatly assisted by the queen in his efforts to better the condition of his people. He is the father of three children, princesses Yolanda and Mafalda and Prince Humbert. During the War of the Nations no conscripted soldier in his armies was more active than the

king. He kept himself constantly in the field, enduring hardships and exposing himself to dangers.

Consult Gardiner's *The War Lords;* Vacaresco's *Kings and Queens I Have Known.*

**VICTORIA,** the smallest and most densely populated state of the Commonwealth of Australia. It has an area of 87,884 square miles, which is a little less than that of Great Britain or the combined areas of Virginia and North Carolina. Victoria occupies the extreme southeastern portion of the continent, and is roughly triangular in shape (see colored map, following page 488).

**People and Cities.** Victoria ranks second among the states of the Commonwealth in population, being surpassed only by New South Wales. According to the census of 1911 its population in that year was 1,315,551. In 1916 it was estimated to be 1,437,000. Nearly ninety-eight per cent of the inhabitants are of British descent; over three-fifths of the total population of the state live in cities and towns. The chief municipalities are Melbourne, the capital; Ballarat, Bendigo, Geelong, Warrnambool, Castlemaine, Maryborough, Hamilton, Mildura and Stawell.

**Physical Features.** The coast line, which has an extent of about 800 miles, is extremely irregular. Chief among its numerous indentations is the magnificent Port Phillip Bay, one of the largest and deepest land-locked bays in the world. It has an area of 875 square miles and an entrance barely two miles wide, affording safe anchorage for the largest ships. At the head of this bay is situated the city of Melbourne.

The eastern portion of Victoria is traversed by numerous mountain ranges known as the Australian Alps, whose highest peak, Mount Bogong, has an altitude of 6,508 feet. This region is famous for its beautiful scenery. The mountains are covered with dense forests of eucalyptus or gum trees, some of them being of gigantic proportions. The northwestern portion consists of level or slightly undulating plains, covered with grass. The state is watered by a number of rivers, most of which flow through fertile and well-settled valleys. The chief river, the Murray, for a distance of over 670 miles forms the northern boundary of the state, separating it from New South Wales.

Victoria has a warm, pleasant and healthful climate. In the lowlands the temperature seldom reaches the freezing point, but in summer the thermometer sometimes registers over 100° in the shade. The rainfall is usually regular and abundant, but droughts sometimes occur.

**Natural Resources.** Victoria is the chief agricultural state in the Commonwealth, and possesses over six million acres of land under cultivation. The chief crops are wheat, oats, barley, potatoes and hay. Grapes take the lead among fruits, and much attention is given to the manufacture of wine. Stock raising is extensively carried on, and dairy farming is well developed. Sheep raising forms one of the chief sources of wealth, the state having over 12,000,000 sheep. The wool clip amounts to over 100,000,000 pounds a year.

LOCATION OF VICTORIA

The chief mineral wealth of Victoria consists in its gold deposits; gold valued at about $9,000,000 is mined every year. The total quantity extracted from its discovery in 1851 until 1914 was 73,958,615 ounces, valued at $1,476,000,000. The richest fields are at Bendigo and Ballarat. Other minerals found are silver, antimony, tin and coal.

**Commerce.** The overseas trade of Victoria is extensive, the principal exports being wool, dairy products, wheat, wine and gold. Most of the trade is with England. The state has over 3,850 miles of railroads, which radiate from Melbourne, its chief city and port. The railroads are owned and operated by the government.

**Government and History.** The chief executive officer, the governor, is appointed by the British sovereign. The legislature consists of an upper house of thirty-four members, elected for six years, and a lower house of sixty-five members, elected for three years. Women have the right to vote. Victoria sends twenty-one members to the Federal House of Representatives.

The first permanent settlement in this part of the continent was made in 1834, and in 1835 the colony was incorporated within the territory of New South Wales. In 1851 it was constituted a separate colony and named Victoria, for the reigning British sovereign. The discovery of gold brought large numbers of settlers into the state, which developed rapidly. Victoria was heartily in favor of the federation of

the Australian colonies (see AUSTRALIA, pages 491 and 494), and has kept pace with its sister states in enacting advanced legislation along the line of social and political democracy. O.B.

Consult Smith's *Cyclopaedia of Victoria;* Turner's *History of the Colony of Victoria.*

**Related Subjects.** The following articles may be consulted in connection with this discussion of Victoria:

Ballarat
Gold
Melbourne
Murray River

**VICTORIA,** *vik to'ri a* (1819-1901), queen of Great Britain and Ireland and empress of India, one of the greatest sovereigns of the British kingdom. Her reign of sixty-four years was a period of unprecedented industrial development and prosperity and surpassed in length that of any of her predecessors. Only Louis XIV of France of all the crowned heads of the world ruled longer. She was the only child of the duke of Kent, fourth son of George III. Her father died before Victoria was a year old, and she was brought up carefully and wisely by her mother at Kensington Palace, where she was born.

VICTORIA

In the words of the English poet, Alfred Noyes, she—
* * * * mightily reigned,
throned in the people's love.

Upon the death of her uncle, William IV, the third son of George III, on June 20, 1837, she inherited the throne and was crowned at Westminster, June 28, 1838. Her education in politics and government had been directed by the sage and loyal Lord Melbourne, who became her first counsellor, and to him much credit is due for the queen's wonderful ability and her great spirit of democracy. She realized the responsibilities of her position and said, "I have immensely to do, but I like it very much —I delight in this work."

In February, 1840, the queen was married to her cousin, Prince Albert of Saxe-Coburg-Gotha. The marriage was not only one of happiness but also of great benefit to the kingdom, for the Prince Consort, a student, philanthropist and business man, devoted himself to the interests of the people and was the queen's chief adviser in many important affairs of government. Victoria and Albert had four sons and five daughters:

Victoria, the Princess Royal, was born in 1840. In 1858 she was married to Crown Prince Frederic William of Prussia, afterward emperor of Germany. She died in 1901.

Albert Edward, Prince of Wales, was born in 1841. In 1863 he was married to Princess Alexandra, daughter of the king of Denmark. He succeeded his mother in 1901 as Edward VII. and upon his death was succeeded by his son, George V.

Alice, born in 1843, was married to Prince Frederic William of Hesse in 1862 and died in 1878.

Alfred, duke of Edinburgh, born in 1844, was married to the Grand Duchess Marie, daughter of the Czar of Russia, in 1874, and died in the same year as his mother.

Helena, born in 1846, was married to Prince Christian of Schleswig-Holstein in 1866.

Louise, born in 1848, was married in 1871 to the Marquis of Lorne, later Governor-General of Canada.

Arthur, duke of Connaught, born in 1850, was married in 1879 to Princess Louise Marguerite of Prussia. He was formerly Governor-General of Canada.

Leopold, duke of Albany, born in 1853, was married in 1882 to Princess Helena of Waldeck and died in 1884.

Beatrice, born in 1857, was married in 1885 to Prince Henry of Battenburg.

**Importance of Her Reign.** It is impossible to overestimate the significance of this long reign in the history of England. Of course by no means the greater part of this significance was due to the queen; such ministers as Peel, Russell, Palmerston, Disraeli, Gladstone and Salisbury were in the periods of their power the dominating force in the history of the times. But Victoria, by reason of her clear-sightedness, her moderation, and, above all, her sterling character, had a very real influence on every political movement of importance.

A list of even the outstanding events of this reign would be a long one; certain happenings, however, deserve special emphasis. Canada passed through more than one crisis during the period. In 1837-1838 occurred the serious disturbance which resulted in the reuniting of Upper and Lower Canada, and in 1867 the confederation of Canada was effected. In India events of even greater moment occurred. The Sepoy Mutiny broke out in 1857, and led in the next year to the transfer of India from the East India Company to the Crown; in 1876 Victoria formally assumed the title of Empress of India. The Opium War in China (1840-1842); the repeal of the corn laws (1846); the Chartist agitation (1848); the Crimean War (1854-

1856); the enfranchisement of the Jews (1858); the disestablishment of the Irish Church (1869); the Chinese, Abyssinian, Ashanti, Afghan and Zulu wars; the passage of a number of parliamentary reform measures; the establishment of a large measure of British control in Egypt; Australian federation (1900), and the South African War were some of the additional events that rendered this reign of supreme importance. Every part of the Empire was affected, and it may be said truly that Great Britain at Victoria's death was a new Great Britain, differing in very many of its ideals and principles from that over which she assumed sway in 1837.

After the death of Albert in 1861 Victoria withdrew from social life, but never failed in any of her essential duties as queen. With impressive ceremonies the people of the Empire in 1887 celebrated the golden jubilee of her reign, and ten years later her diamond jubilee was attended with even greater splendor. Her death, on January 22, 1901, at her winter home on the Isle of Wight, was profoundly mourned throughout the world. Among all the sovereigns of history none is held in higher esteem by Christian nations. E.B.P.

Consult Tooley's *The Personal Life of Queen Victoria;* Lippincott's *Queen Victoria: Her Girlhood and Womanhood;* Hird's *Victoria, the Woman.*

**Related Subjects.** In connection with the history of this reign the reader may consult the following articles in these volumes:

| | |
|---|---|
| Albert, Francis Charles | Opium, subhead |
| Chartism | *Opium War* |
| Connaught, Duke of | Rebellion of 1837 |
| Crimea, subhead | Sepoy Rebellion |
| *Crimean War* | South African War |
| Great Britain, subtitle | Union, Act of |
| *History* | |

**VICTORIA,** the capital city of British Columbia, is, with the exception of Vancouver, the largest city in the province. It is situated on a small but safe harbor at the southeast end of Vancouver Island, which is separated from the mainland at this point by the Strait of Juan de Fuca. It is the largest manufacturing center on Vancouver Island, but it is also one of the most attractive residential cities in the Dominion. Its climate is delightful; violent extremes of temperature are almost unknown, and flowers blossom outdoors practically throughout the year. Population in 1911, 31,660; in 1916, about 60,000.

**Commerce and Industry.** Victoria is the terminus of two railways, the Esquimalt & Nanaimo (Canadian Pacific), running northward to Courtenay, and the Victoria & Sydney, running to Sydney, eighteen miles away. With the Canadian Pacific, the Canadian Northern and other railways of the mainland it has connection by steamer with Vancouver, 84 miles northeast, and with Seattle, 80 miles to the south. By far the most important part of its shipping is with other Pacific ports in the United States and in Canada, and with China, Japan and Australia. Victoria's commercial importance is due to the products of the mines, the forests and the fisheries of Vancouver Island and the adjacent mainland. It is the first port of call reached by incoming steamers to Vancouver and ports on Puget Sound, and is visited by all outgoing steamers. The city's imports are worth about $10,000,000 a year, and the exports nearly $2,000,000.

Ship building and repairing is naturally a large industry, and a dry dock is one of Victoria's important plants. The city has over 150 factories, with products ranging from canned fish, biscuits and soap to lumber, furniture, tents, paints, brass articles and machinery. From 1901 to 1911 the value of Victoria's manufactures increased from $2,617,000 to $4,244,000, and the annual average is now considerably over $5,000,000.

**Features of the City.** Victoria is not only a commercial and manufacturing center, but is one of the most attractive residential cities in Canada; it is chosen as a home by many persons of independent means, and is a resort for tourists from all parts of the world. The most conspicuous feature in Victoria is the parliament buildings, overlooking James Bay. In addition to the legislative chamber and the government offices, the building contains the provincial library and fine collections of natural history, minerals and agricultural specimens. It was completed in 1898, and was formally opened on February 10 of that year. The cost was over $1,000,000 (for illustration see BRITISH COLUMBIA, page 939). Near by is the magnificent Empress Hotel, owned by the Canadian Pacific Railway, the two buildings making an imposing picture for travelers arriving by steamer. Government House (the residence of the lieutenant-governor), the Jubilee Hospital, city hall, customs house and post office are other handsome buildings.

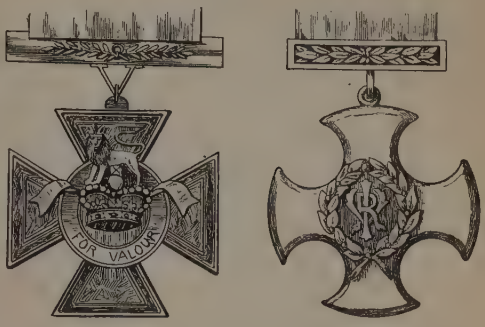
Beacon Hill Park, a natural pleasure ground, deserves special mention. It faces the Strait of Juan de Fuca, and affords one of the most magnificent views in the world—over the waters

of the strait to the snow-clad heights of the Olympian Range and the noble dome of Mount Baker. Victoria Arm and the Gorge form a beautiful stretch of water, and there are many other bays and inlets which lend variety and attraction to the city and its vicinity. All parts of the city are easily accessible by electric tramway.

**History.** Victoria is the oldest settlement in British Columbia. It dates back to 1846, when a Hudson's Bay Company post, named Fort Camosun, was established on the site. The town was platted in 1852, but remained merely a trading post until 1858. In that year it came into prominence as the result of the discovery of gold on the mainland. From this time on Victoria grew rapidly. It was incorporated as a city in 1862, and in 1868 became the capital of British Columbia. Until the founding of Vancouver, Victoria was the largest city in the province, its population being nearly 15,000 as early as 1886. After 1880 the use of the Esquimalt harbor, three miles west, as a base for the British North Pacific fleet helped greatly in increasing the prosperity of the city. Since 1905 the Esquimalt harbor has been open to merchantmen, and the Dominion government is spending about $10,000,000 for the construction of wharves and a dry dock at Esquimalt, which will be added to the facilities already offered by Victoria. W.F.Z.

**VICTORIA CROSS,** the most coveted and highly-prized decoration of the British military and naval service. In shape it is a Maltese cross, and is made from the metal from guns captured in the Crimean War, with the words *For Valour* inscribed beneath the royal crest. This decoration was instituted by Queen Victoria in 1856, to be granted to soldiers and sailors of any rank for notable deeds of valor in presence of the enemy. The medal is worn suspended from a ribbon—red for the army, blue for the navy. A pension of $250 a year accompanies this decoration. It is customary to bestow the Cross on the nearest of kin to any soldier or sailor who dies from wounds received while performing the qualifying act of valor. Intrinsically worth five or ten cents, the Victoria Cross is the most cherished possession of British soldier or sailor, and as the French soldier dreams of a marshal's baton, so the British seeks to deserve this Cross.

The number awarded up to the outbreak of the War of the Nations was only 522. During the latter great conflict many more were granted, because of numerous acts of conspicuous bravery, yet it was bestowed sparingly, that it might not be cheapened in the eyes of the nation. In strong contrast, the Iron Cross of the German Empire was awarded to the number of more than 2,000,000 during the first three years of the war (see IRON CROSS).




FOR VALOR AND DISTINGUISHED SERVICE

At left, the priceless "V.C.;" at right, the badge of the Distinguished Service Order.

**Distinguished Service Order.** When an officer's name is proposed for the Victoria Cross, the feat prompting the nomination is put under official scrutiny. If it does not reach in valor the superlatively-high standard set for the award of the Cross, yet is found deserving of high recognition, the Distinguished Service Order may be conferred. This Order is reserved for officers of the army and navy. F.ST.A.

Consult Parry's *The V.C., Its Heroes and Their Valour.*

**VICTORIA FALLS,** a celebrated cataract in South Africa, discovered by Livingstone in 1855 and named by him in honor of England's queen. The falls are in the middle course of the Zambezi River, in the British possession of Rhodesia. The river approaches the chasm at a gentle grade, but suddenly dashes over a cliff nearly 400 feet high, with a deafening roar which can be heard for twenty miles. The mist and flying spray are visible for nearly ten miles, and because of this cloud the natives named the cataract *Mosi-oa-tuni,* which means *thundering smoke.* The Cape-to-Cairo Railway crosses the river near the great falls, on the highest bridge in the world (see illustration, page 1170); Cecil Rhodes stipulated that it should be close enough to the great cataract to allow travelers on the train to feel the spray.

The British South Africa Company has planned to utilize the enormous water power for commercial uses. A hotel has been built for the accommodation of visitors, and numerous companies have been formed for develop-

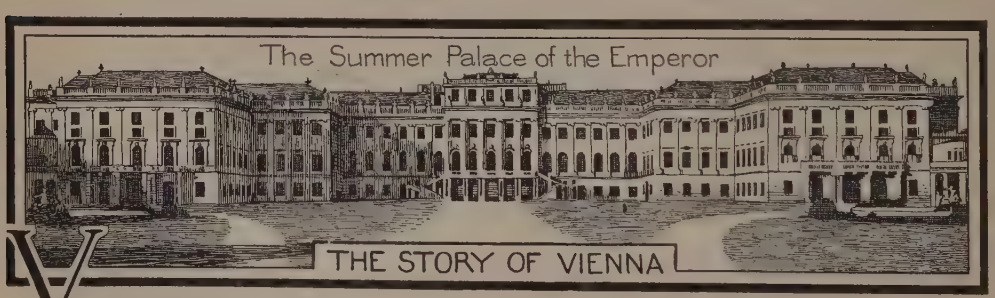
ing land and minerals in the region. Victoria Falls are over twice as high as those at Niagara (see NIAGARA FALLS AND RIVER).

**VICTORIA NYANZA,** *ni an'za,* the largest lake in Africa, and the headwaters of the River Nile. Its area of 26,000 square miles is about nine-tenths that of Lake Superior, the only larger fresh-water body in the world. It lies partly in German East Africa and partly in British Uganda (see map, opposite page 81). Victoria Nyanza was discovered in 1858 by Speke and Burton, and named for the reigning English queen. *Nyanza* is the native name for *lake.*

The lake is 3,775 feet above sea level, drains an area of 92,000 square miles, and has an annual rainfall of seventy-five inches. At the point where it opens into the Victoria Nile it drops over Ripon Falls. Navigation has been carried on by steamboats since 1898, and by native craft for an unknown number of years. The lake is rocky and shallow, but is well stocked with fish. Its numerous islands were once populated, but the fatal sleeping sickness (which see) has driven all of the natives to regions not infested with the carrier of the disease, the tsetse fly. Entebbe, Port Bell and Jinja, the chief Uganda ports on the lake, are connected with the Uganda Railway terminus by regular steamship lines. Jinja is also connected by railway with Lake Kioga.

**VICTORIAVILLE,** a town near the center of Arthabaska County, on the Grand Trunk Railway, thirty-seven miles by rail southeast of Three Rivers, sixty-six miles southwest of Quebec and 108 miles northeast of Montreal. There is auto-bus connection with Arthabaska, the county town, two and a half miles southeast. Victoriaville receives abundant electric power from Shawenegan Falls, and has become an important manufacturing center. Among its many products, which have an annual value of nearly $1,000,000, are chairs and other furniture, maple syrup, cheese, clothing, soda water, springs and mattresses, perfumes and builders' supplies. There are a Roman Catholic college, convent and academy for boys. Population in 1911, 3,028; in 1916, about 4,500.

**VICUÑA,** *vi koon'ya,* an alert, active animal of the camel family, found at great elevations in the most desolate parts of the mountains in South America. It belongs to the same group as the llama, guanaco and alpaca. It subsists on grass, and is usually found in herds of from six to fifteen females, with one male as guide and protector. The vicuña is smaller than the guanaco, being about two and one-half feet high at the shoulder, and has a long, slender neck, protruding muzzle and long, pointed ears. It is hunted for its fine, short wool, which is light brown in color, more valuable than that of the alpaca and equal in quality to that of the merino sheep. The vicuña has never been domesticated, and is trapped when hunted, instead of being shot, so its hide will not be injured. See GUANACO.




## THE STORY OF VIENNA

**VIENNA,** *ve en'a* in German WIEN, *veen,* is the capital of the Austrian Empire and the metropolis of Austria-Hungary, in population the fourth city among European municipalities, and the seventh among the cities of the world (see CITY, page 1393). The most recent official census (1911) reported the population as 2,031,498, but at the outbreak of the War of the Nations the city was estimated to have a population of 2,149,800. About three-fourths of the permanent residents are Roman Catholics and are of German blood; it is in its sympathies a German city. It lies on the right bank of the Danube, at the head of a beautiful plain between the Carpathian and Alps mountains, and is 330 miles southeast of Berlin. Though the population is less than that of the German capital, the area of Vienna is three times that of Berlin.

The Austrian capital is a remarkable city from many points of view. In the number of imposing public buildings, representing the best

in modern architecture, and in extent of magnificent squares and parks, it is surpassed by no other city in the world. It is a musical center of first rank, preserving the traditions of Haydn, Mozart, Beethoven and Schubert, each of whom lived and worked there at some period in his career. Within recent years, from Vienna have come many notable light operas, and in this field the city has a unique place.

The Viennese themselves are known as a hospitable people who love gayety, music, the dance and the theater, and enjoy life in a whole-hearted way. The Viennese atmosphere of hospitality and good-fellowship attracts every year in normal times thousands of tourists and pleasure seekers, and art and music students congregate there from all over Europe and America.

**General Description.** As it is organized at the present time, Vienna is divided into twenty-one districts, all but ten of which were incorporated as a part of the city after 1891. A rampart and fosse known as the *Lines* were built around the original city—the first ten districts of modern Vienna—in 1704, but in 1892, when a number of the outlying suburbs were annexed, this girdle of fortifications was demolished, and the site is now occupied by the Gürtelstrasse, a handsome boulevard. The Ringstrasse, another spacious boulevard, and the city's most famous thoroughfare, encircles the nucleus of Vienna, the so-called *Inner City*. In this district are the imperial palaces, government buildings and many other imposing edifices.

Until 1857, when the modernization of Vienna began, the course of the Ringstrasse was followed by a series of inner fortifications. An arm of the Danube, known as the Danube Canal, intersects the city in a northwest-southeast line, and is crossed by many beautiful bridges. A small stream, the Wien, flows into the canal. Many of the narrow, irregular streets of the Inner City remain, but others have been replaced by modern avenues, and the general appearance of the district is very impressive. It is noteworthy that over half of the area of the newer districts is occupied by woods, private gardens, parks and open spaces, and the working people are forced to live in sections far too densely populated for comfort. Apartment buildings are the rule, private homes the exception.

**Notable Buildings.** A conspicuous object near the central part of the Inner City is the Cathedral of Saint Stephen, one of the few medieval edifices of this essentially modern municipality and the most famous church in Austria. Its graceful spire rises to a height of 450 feet, and from the summit one may enjoy an inspiring view of the great city, the winding Danube and the distant hills. Southwest of the church is a spacious area occupied by a group comprising the imperial palace, or Hofburg. Since the thirteenth century this great pile, representing hundreds of years of building and many different styles of architecture, has been the official residence of the Hapsburgs. One of the handsomest of the buildings is the Imperial Library, which contains 800,000 volumes, many priceless manuscripts and valuable art collections. See HAPSBURG.

The main body of the Hofburg is separated from the Ringstrasse by spacious gardens, and on the boulevard, just opposite the palace, are two beautiful domed buildings in Italian Renaissance style—the Imperial Museums of Art and of Natural History. To the west of the museums is the Palace of Justice, in German Renaissance style, and beyond it are the two Houses of Parliament, approached by a portico of columns. The Parliament Houses represent a modern adaptation of Greek architecture. The Rathaus, or town hall, which stands in a small park, is one of the finest buildings in the city. It is an example of Gothic architecture, and exhibits a wonderful elaboration of ornamental detail. Its clock tower is 320 feet high. The Rathaus contains the city library, the Historical Museum and a municipal collection of weapons.

North of the Rathaus Park is the great quadrangular building of the University of Vienna (see subhead, below), a superb example of the Tuscan Renaissance style. The Court, or Hofburg, Theater, another Renaissance structure, is on the inner side of the Ringstrasse, opposite the Rathaus. Other fine buildings on the boulevard include the Opera House, a worthy rival of the one in Paris, the Academy of Art, the splendid home of the Stock Exchange and the Austrian Museum of Art and Industry. Other handsome edifices rise in the sections outside the boulevard, and both the Inner City and the districts beyond are beautified with gardens, parks, squares and imposing monuments.

**Institutions.** Vienna possesses many educational, scientific, art and benevolent institutions. The public picture gallery, in the Museum of Art, is noted for its collection of paintings, especially those of Viennese artists

and several canvases of Dürer and Rubens. Valuable collections of a varied nature are to be found in the imperial treasury of the Hofburg, in the Academy of Art, the Museum of Art and Industry and the Museum of Natural History. The leading educational institutions, in addition to the university, include the Conservatory of Music, the Polytechnic Institute, theological schools, an academy of Oriental languages and a military academy. Hospitals are numerous, and because they offer such a wealth of clinical material they draw to Vienna large numbers of American physicians and surgeons. The general hospital of Vienna is the largest on the continent.

**Commerce and Industry.** Vienna is the leading industrial and commercial center of Austria, and is the focus of all the important railway lines in the empire. It lies at the point where railroad routes from Petrograd, Berlin, Paris and Rome cross. The Danube Canal has been converted into a great harbor by the construction of a lock at its entrance, and the city is therefore an important Danube port. There is great manufacturing activity in Vienna, especially in the field of artistic wares, and in the elegance of its shops this city may be compared with Paris. Other lines of manufacture include machinery, clothing, textiles, chemicals, musical instruments and malt liquors. The important articles of trade include coal, iron, art publications and manufactured products.

**Government and History.** Vienna is practically independent in matters of administration, but is nominally subject to the Diet and the governor of Lower Austria. In alternate years the Delegations of the Austrian and the Hungarian Parliaments meet in Vienna (see AUSTRIA-HUNGARY, page 505). The city is the outgrowth of a Celtic settlement which the Romans seized and converted into a fortified camp early in the Christian Era. It was called by them Vindobona. The date of the adoption of the name Vienna is obscure, but the name is mentioned in a document of 1130. During the Crusades the place became a prosperous trading center, and in the thirteenth century the Hapsburg rulers of Austria made it their capital. In later European history it was a storm center of many wars, and on July 28, 1914, when the Austrian government declared war on Serbia, it became the first war capital of Europe.

**University of Vienna.** Founded in 1365 by Duke Rudolph IV, the University of Vienna ranks with the oldest and best European institutions of higher learning. It is organized into departments of law and political science, theology, medicine and philosophy, and its medical college has a world-wide reputation because of the variety of its clinics and the famous specialists who direct them. The library, founded by the Empress Maria Theresa, contains over 857,000 volumes and manuscripts. Connected with the university are seminaries, museums, finely-equipped laboratories, an observatory and a botanical garden. The regular student enrollment is over 5,000, and there are more than 630 instructors. R.D.M.

**VIENNA,** CONGRESS OF, a convention which remade the map of Europe after Napoleon's downfall. It was a meeting of representatives of all the powers of Europe, in the winter of 1814-1815. Great Britain, Austria, Russia and Prussia, whose alliance had sent the defeated Napoleon to exile in Elba, secretly agreed to rule the Congress in their own interest, but Talleyrand, the French delegate, shrewdly took advantage of their dissensions over the division of Poland and Saxony, and forced them to admit him to their number.

Europe was busy for a hundred years afterwards in undoing the work of the Congress. The French Revolution had awakened the spirit of nationality all over the continent, but the members of the Congress saw nothing of the spirit of the age. They represented kings, not peoples. They joined Belgium and Holland, countries of different language, customs and history, thus causing a war in 1830. They gave Prussia the Rhine provinces, Austria most of Northern Italy, and Russia a wedge of Polish territory between Austria and Prussia, all without consulting the people, thus arousing disputes which contributed to the War of the Nations a century afterwards.

The Monroe Doctrine (which see) owes its origin partly to attempts of the Congress to establish a French prince in South America.

**VIKINGS,** *vi'kings.* See NORTHMEN.

**VILLA,** *veel'ya,* FRANCISCO, or PANCHO (1877- ), a Mexican bandit and revolutionist whose raids across the American border in 1916 brought the United States close to a state of warfare with Mexico. His real name was DOROTEO ARANGO; *Villa* was assumed after he became involved in the Madero revolution.

He became an outlaw in early youth, and during the Diaz régime a reward was offered for his capture. When Diaz was forced to resign in 1910, Villa joined cause with Madero, serving under Huerta, but the subsequent revolution against Huerta found him supporting

Carranza. Crafty and without any sense of loyalty, he soon turned against Carranza, and throughout the year 1915 his forces were continually at war with those of the Provisional President. Representatives of the two leaders met late in the year to arrange a truce, but Carranza refused to guarantee Villa's safety and insisted that he be treated as an outlaw.

FRANCISCO VILLA

In 1916 the bandit chief began depredations in United States territory, and on March 8 the town of Columbus, N. M., was raided. This outrage caused President Wilson to order out United States troops. Though the expeditionary force penetrated 500 miles south of the Rio Grande, the troops were recalled early in 1917 without having succeeded in capturing Villa. He, meantime, had found safety in the mountain fastnesses. Though he resumed his occupation of banditry after the withdrawal of the Americans, he was careful not to encroach on United States soil. See MEXICO, subtitle *Government and History.*

**VILLEINS,** *vil'inz,* a class of serfs in feudal times who were allowed by their overlords to cultivate portions of land for their own use on condition of performing menial service. The villeins were bound to the soil, and their children were born into bondage, but they were afforded protection by the state against extreme cruelty on the part of their masters. Lands held in villeinage frequently passed from father to son until right by *prescription,* or long use, was acquired, but the villeins themselves were still under compulsory service. As their sole title to these lands was merely a copy of the entries on the court roll, in time they came to be called *tenants by copy of court roll,* and their tenure was known as a *copyhold.* Villeinage ceased to exist in the sixteenth century, but was never formally abolished in England. The word *villein* has come down in the form *villain,* and in current usage means a *rogue,* though this harsh significance did not originally attach to it. See FEUDAL SYSTEM.

**VIL'LI** (the plural of *villus*), are minute projections which cover the mucous membrane of the small intestine. This surface may be compared to the "pile" on velvet. The purpose of the villi is to absorb nutritious matter from the food digested by the intestine. Each villus consists of a framework of connective tissue, covered with a layer of cells and having in the center lymphatic vessels called lacteals. These lacteals are filled with a milky-white liquid during the process of digestion. Near the surface of the villus is a layer of muscular tissue, beneath which there is a network of blood vessels. See LACTEALS; LYMPH, subhead *The Lymphatic System.*

**VIL'NA,** a city in the western part of Russia, capital of the government of Vilna, situated at the intersection of three railway lines and on the navigable Vilia River. It is 436 miles southwest of Petrograd and 225 miles northeast of Warsaw (see map, following page 2092). Vilna is a religious and educational center for Orthodox Greeks, Roman Catholics and Jews, and possesses many notable cathedrals, monasteries and schools. As a whole the city lacks distinction, because of the irregularity of its plan and its lack of modern improvements. The industrial establishments include manufactories of tobacco products, knit goods, clothing and other commodities, and there is an extensive trade in grain and timber. The city was founded in the tenth century, and during the fourteenth became the capital of Lithuania. It was annexed to Russia in 1795. In 1915, during the War of the Nations, it was captured by the Germans. Population in 1913, 203,940. The inhabitants are chiefly Jews, Poles and Lithuanians, and the city is an important center of Jewish life.

**VINCENNES,** *vin senz',* IND., the county seat of Knox County. It was old before most American cities were first settled, a fortress and town when the untouched forests grew over Chicago. It is so old that only Saint Augustine, down on the southeastern peninsula, and Santa Fe, away out on the southwestern desert, may compare with it. It is situated on the Wabash River, the southwestern state boundary, 117 miles southwest of Indianapolis and 151 miles east of Saint Louis. It is served by the Baltimore & Ohio Southwestern, the Chicago & Eastern Illinois, the Cleveland, Cincinnati, Chicago & Saint Louis and the Vandalia railroads. The population was 14,895 in 1910, and 17,645 in 1916, the latter figure a Federal estimate.

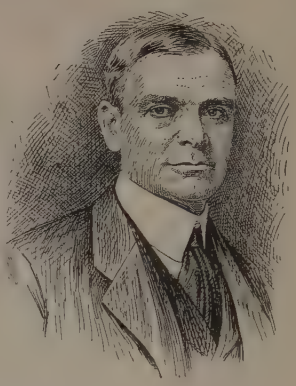
The city is the seat of Vincennes University, the oldest institution of higher learning in the state, and has a $75,000 Federal building; a Y. M. C. A. building, erected at a cost of $115,000; a public library, a courthouse, a city hall, the homes of several fraternal orders, two hospitals, two orphans' homes and a county poor asylum. There are a number of parks and playgrounds; the largest, Lincoln Park, contains forty-five acres. Of historic interest are the old territorial legislative hall, the first in Indiana; the home of William Henry Harrison while he was territorial governor; Fort Knox and Fort Sackville, and Indian mounds. There are oil, gas and coal fields in the vicinity. In addition to the enterprises connected with these resources, Vincennes has foundries and machine shops, an iron rolling mill, a canning factory and manufactories of structural steel for bridges, window glass, farm implements, furniture and buttons.

About 1732 the French established a fort near what had been the site of a Piankashaw Indian village. The settlement which gradually grew up about the fort was first known as "The Post," and later as "Post Vinsenne," in memory of its historic founder, François Morgan de Vinsenne. In 1763 it was taken by the British, but in 1779 was captured by Col. George Rogers Clark in the name of Virginia, and was ceded to the United States in 1783. From 1801 to 1816 Vincennes was the capital of the Territory of Indiana. It became a city in 1856. *Alice of Old Vincennes,* a novel by Maurice Thompson, relates an appealing romance of the early days. C.B.C.

Consult Powell's *Historic Towns of the Western States.*

**VIN'CENT,** GEORGE EDGAR (1864- ), an American educator and university president, the son of John H. Vincent, founder of the Chautauqua idea and Bishop of the Methodist Episcopal Church (see VINCENT, JOHN HEYL). He was born at Rockford, Ill., was graduated from Yale University in 1885, and for a year was engaged in editorial work. After traveling for a time in Europe and the Orient, he became editor of the *Chautauqua Press,* and in 1888 was made vice-president of the Chautauqua Literary and Scientific Circle, of which he was elected president in 1907.

Meanwhile, in 1894, he had become a member of the faculty of the University of Chicago, and by 1904 had risen to the rank of full professor of sociology. From 1900 to 1907 he was dean of the junior colleges, and from 1907 to 1911 dean of the faculties of arts, literature and science. Professor Vincent was unusually successful in his classroom work, and won a wide reputation as lecturer and occasional speaker. In 1911 he succeeded Cyrus Northrup as president of the University of Minnesota, and in 1917 left Minnesota to accept the presidency of the Rockefeller Foundation (which see). He has published *Social Mind and Education,* and, with Albion W. Small, *An Introduction to the Study of Society.*



GEORGE E. VINCENT

**VINCENT,** JOHN HEYL (1832- ), a Methodist Episcopal bishop, best known as one of the founders of the Chautauqua Assembly movement, which developed the Chautauqua Literary and Scientific Circle. He was born at Tuscaloosa, Ala., began to preach at the age of eighteen, and to fit himself for his chosen work studied at Wesleyan Institute, Newark, N. J. After holding various pastorates in the East he was transferred to Rock River Conference, in Northern Illinois, and preached in and near Chicago. In 1865 he established the *Sunday School Quarterly,* in the next year the *Sunday School Teacher,* and from 1868 to 1884 was corresponding secretary of the Methodist Sunday School Union and editor of its publications.

Meanwhile, in 1874, he helped to found the Chautauqua Assembly, and was chancellor from 1878 until 1900 of the greater Chautauqua movement which he helped to inspire. He was chosen bishop in 1888, with headquarters at Topeka, Kansas, and in 1900 was made resident bishop in charge of the European work, retiring in 1904 from the active work of the episcopate. A son of Bishop Vincent is George E. Vincent, since 1917 president of the Rockefeller Foundation. His publications include *Little Footprints in Bible Lands, Earthly Footsteps of the Man of Galilee, The Chautauqua Movement* and *Family Worship for Every Day in the Year.* See CHAUTAUQUA.

**VINCI,** *veen'che,* LEONARDO DA (1452-1519), an Italian artist of the High Renaissance,

whose *Last Supper,* painted on the wall of the refectory of the monastery of Santa Maria delle Grazie, at Milan, is one of the world's greatest paintings. Leonardo was a man of almost universal genius. In the fine arts he distinguished himself not only as a painter but as a sculptor, architect, musician and art critic; he was also a mechanician, a civil and military engineer, an anatomist, a botanist, an astronomer and a geologist—in fact, a student of all the physical and mathematical sciences. He attempted so much that he was not able to carry many undertakings to completion, but his few creations bear the stamp of genius.

DA VINCI
He gave to the world the priceless *Last Supper* and *Mona Lisa.*

Leonardo was born at Vinci, not far from Florence, and very early in life gave evidence of the diversity of talents which distinguished him in later years. He soon surpassed his instructor, Verrocchio, the celebrated Florentine painter. When thirty years of age he entered the service of Ludovico il Moro, the Duke of Milan, who ordered the painting of the *Last Supper.* Though faded and injured by smoke, dampness and clumsy efforts to retouch it, the *Last Supper* is still a marvel of spiritual beauty. It shows the moment after Christ has announced that one of His disciples will betray him, and depicts the consternation of the Twelve with wonderful realism. The grouping of the picture is also worthy of admiration—Christ in the center and the disciples in groups of three on either side.

In Milan, Leonardo made his influence lasting by the founding of an Art academy. After the occupation of that city by the French, he went to Florence, where he painted the most celebrated of his easel pictures, the wonderful portrait of Mona Lisa del Giocondo, a Florentine lady of prominence. The "inscrutable" smile of this lady has been the subject of endless discussion, and it is said that Leonardo caused her to assume her mysterious expression by having music played during the sittings. In 1911 this priceless painting, commonly known as *Mona Lisa,* which is one of the glories of the Louvre, in Paris, was cut from its frame. Two years later it was recovered from the thief, an Italian, who stole it out of patriotic motives.

In 1502 the artist was appointed chief engineer and architect of the Pope's army, which gave him the opportunity to visit many of the fortified posts in the Papal dominion. The closing years of his life were spent in the service of France. King Francis I interested himself in this versatile genius and assigned for his use the Chateau Cloux, near Amboise, where he died. Under the shadow of the great Cathedral of Milan a marble monument has been erected to his memory. Among his later works are the famous *Virgin of the Rocks,* in the National Gallery, London, and a figure of *Saint John the Baptist,* in the Louvre, Paris. He was also the author of a celebrated treatise on painting. R.D.M.

Consult Bell's *Great Masters.*

**VIN'EGAR,** a sour liquid of reddish or yellowish color, used extensively as a condiment and in pickling and preserving foods. Its sourness is due to the active principle, acetic acid, which it contains, but the special flavor and odor that distinguish one brand of vinegar from another are determined by the materials used in the manufacturing process. The amount of acetic acid in vinegar varies from four to eight per cent.

There are two general methods employed in vinegar making—the natural fermenting process and the so-called quick process. The former method consists in exposing beer, weak wines or cider to air until they turn sour through the conversion of the alcohol into acetic acid. The process is slow, and is successfully carried out only under certain conditions of temperature. The active ferment which brings about this change, called *mother of vinegar,* may usually be seen on the surface of the liquid as a slimy scum. Malt vinegar is popular among the English, and in America cider vinegar is extensively manufactured.

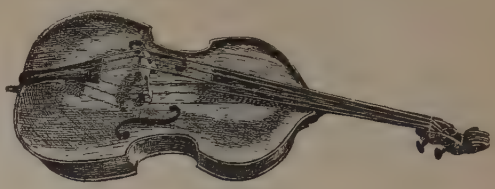
In the quick process, impure dilute alcohol is poured into vats or casks containing beechwood shavings soaked in strong vinegar. There are holes in the vats to permit the entrance and exit of air. As the alcohol soaks down through the shavings it is partly changed into vinegar by coming in contact with mother of vinegar and with oxygen. The liquid as it collects at the bottom of the cask is drawn off and again poured in at the top, and the process is repeated until the alcoholic solution is converted into vinegar.

Cheap vinegars, which usually contain some adulterating material, should be avoided. The presence of sulphuric acid, a common adulterant, can be detected by the simple process of boiling together a small quantity of vinegar and potato starch, and adding iodine to the mixture when cool. Iodine will turn the mixture blue if the vinegar is pure, but will cause no change in the color if a brand containing acid is used. Because acetic acid combines with lead to form lead acetate, which is a deadly poison, vinegar or foods containing it must not be placed in metal vessels. Glass and porcelain utensils alone are absolutely safe for the purpose. See ACETIC ACID.

**VIN'LAND,** the name given to a region on the eastern coast of North America which was visited and explored by Norsemen several centuries before the voyages of Columbus. In 986 Bjarni Herjulfson, a Norwegian Viking, was driven near this coast by storms while he was voyaging from Iceland to Greenland, but the land was not explored until the year 1000, when it was visited by Leif Ericson, son of Eric the Red. He named it Vinland (also spelled *Vineland* and *Wineland*) because of the grapes found growing there. Several attempts were made afterwards to settle the country, but none was successful. Authorities do not know the exact location of Vinland, but believe that it lay somewhere between Delaware and Labrador. There have not been wanting scholars, however, who have assigned a very definite situation to the explorations and settlements of the Norsemen in America. An American antiquarian of the late nineteenth century gained wide credence for his theory that the banks of the Charles River, in the neighborhood of Boston, were the site of one settlement. Even more widespread is the belief that Norumbege, as the Norse settlement was called, was in the vicinity of Newport, Rhode Island; and there is pointed out there a building which these early visitors are supposed to have constructed. This is the Round Tower, or Old Mill, of which Longfellow wrote in his *Skeleton in Armor.*

Consult Olson's *The Northmen, Columbus and Cabot;* Hovgaard's *The Voyages of the Norsemen to America.*

**VI'OL,** a class of stringed instruments that are of special interest as the immediate ancestors of the modern violin and other bowed instruments allied to it. The viol of the fifteenth century represented the culmination of several centuries of development, and may be regarded as typical of the class. It had a flat back, from five to seven strings, sloping shoulders and a broad, thin neck, and was made in several sizes. The modern violin is the outgrowth of the small size, called *treble viol;* the



THE VIOL

modern viola, which is about one-seventh larger than the ordinary violin, evolved from the second size, or *tenor viol.* The next size, the *bass,* was the precursor of the violoncello, or cello; and the largest, the *double bass,* was the predecessor of the modern double-bass viol. See VIOLIN; VIOLONCELLO; ORCHESTRA.

**VI'OLET,** a group of flowering plants whose blossoms are among the most attractive of all cultivated or wild flowers. They are common to Europe, Asia and America, blooming in early spring in shady dells, along mossy banks of streams, and even on barren, gravel hillsides. Low clusters of glossy, heart-shaped leaves partly conceal the five-petaled blossoms, each on a slender flower stalk. Although certain varieties bear white and yellow blooms, the blue and purple are universal favorites. Among the latter are the common purple *meadow,* or *hooded,* species; the *bird's-foot violet,* whose blue and purple, golden-hearted flowers often bloom twice a year, and the *English, March* or *sweet violet,* the flower which has been adopted by Yale College as its emblem. The *dog violet* is so called by the English because it lacks fragrance, "dog" being a term of contempt, and is quite different from *dog-tooth violet,* which is a member of the lily family and not a violet at all. The velvety pansy, another garden

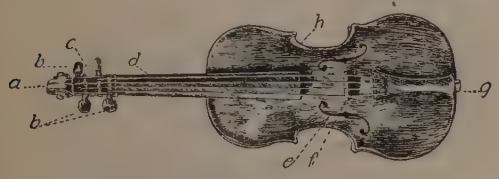
Violets!—deep-blue violets!
April's loveliest coronets!
There are no flowers grow in the vale,
Kiss'd by the dew, woo'd by the gale,—
None by the dew of the twilight wet,
So sweet as the deep-blue violet.
—LANDON: *The Violet.*

favorite, is a cultivated species of wild violet. See PANSY.

Consult Allen-Brown's *The Violet Book;* Galloway's *Commercial Violet Culture.*

**VI'OLIN,** pronounced also, *vi o lin',* the stringed instrument in universal favor both as a solo instrument and for orchestral work. What may be called the foundation of the orchestra is made up of the "strings"—the violin, viola, cello and double bass (see ORCHESTRA). In sweetness and brilliance of tone and in range and power of expression, the violin yields to no other instrument. Like other bow instruments, it has a hollow, wooden *chest,* consisting of two slightly arched surfaces, the *back* and the *belly,* united by sidepieces or *ribs;* a *scroll,* or *head,* in which are placed the *pins,* or *keys,* for tightening or loosening the strings; the *neck,* attached to the chest; the *finger board,* resting on the neck; and *strings,* fastened at one end to the belly by a *tailpiece* and at the other to the tuning pins. The strings passing over the belly are raised up from it by a *bridge.*

On the belly are two *f*-shaped sound holes, opposite each other. The strings, four in number, are of catgut, the lowest being covered with silvered copper wires. The belly is usually made of pine; the back, neck and sides




THE VIOLIN

(*a*) Scroll; (*b*) keys; (*c*) peg box; (*d*) finger board; (*e*) sound holes; (*f*) bridge; (*g*) tail piece.

of sycamore; the bridge, of stippled maple, and the finger board and tailpiece of ebony. The sounds are produced by drawing a bow across the strings. The bow consists of a piece of rosewood averaging about twenty-seven inches in length, to which are attached long horsehair threads. These threads can be tightened or loosened by means of a screw. By tightening the threads the performer is able to increase the volume of the sound.

The violin was the immediate successor of the smallest-size viols (see VIOL), a class of bowed instruments having a flat back, sloping shoulders, *s*-shaped sounding holes and a short finger board with frets. The art of violin making reached its highest degree of perfection in the sixteenth, seventeenth and eighteenth centuries, especially in the city of Cremona, Italy. Cremona produced several of the world's most famous violin makers, notably Antonio Stradivarius, Niccolo Amati and Giuseppe Guarneri. Celebrated masters of violin making also appeared in Germany and France. This instrument has inspired some of the noblest compositions of the great composers. Modern violin players who have won fame include Kubelik, Kreisler, Ysaye, Maud Powell and Mischa Elman.

Consult Abele's *The Violin and Its Story.*

**VIOLONCELLO,** *ve o lon chel' o,* known generally as *cello,* a large instrument of the violin class, which the performer holds between the knees. In the orchestra it has a place between the violin and the double bass. It was evolved from the bass viol in the early part of the eighteenth century. The cello is an important solo instrument, having a rich singing tone which is even more sympathetic than that of the violin. It has four gut strings, the lower two being covered with silvered copper wire, and its bow is shorter than that of the violin, although the instrument itself is much larger. Beethoven, Schumann, Brahms and Mendelssohn composed beautiful solos for the cello.

**VI'PER,** a family of venomous snakes confined to the tropical and temperate regions of Europe, Asia and Africa. Vipers are distinguished by a flat, triangular head, plainly differentiated from the neck, and by a catlike pupil of the eye. In most of the species the top of the head is covered with small scales. The *common viper,* the only poisonous reptile found in Great Britain, is generally less than two feet long, and is usually colored brownish-yellow, with zigzag markings on its back and black, triangular spots on its sides. Its bite is seldom fatal, but usually causes pain and fever.

The so-called *pit viper,* found in America, is distinguished by a deep pit between the eye and the nostrils, which is connected with the brain by a well-developed nerve. This pit is evidently an organ of sense, like the eye or ear, but scientists have not yet learned what its service is to the snake. Some observers believe that it is the organ of a sixth sense, and that man may never hope to understand it because he has no such sense himself.

Many of the best-known and most dreaded serpents of America belong to the viper family. The copperhead, the moccasin and the rattlesnake are all pit vipers.

**VIRCHOW,** *vur' chou,* (in German, *feer' Ko*), RUDOLF (1821-1902), a German scholar, distin-

guished as a scientist, educator, physician and legislator. His most important and most enduring labors were in the field of pathology, the study of diseases. His great work on this branch of science, *Cellular Pathology,* was published in 1858, and it not only won the acceptance of the medical authorities but it displaced for all time the pathological theories previously held. He originated and firmly established the principle that the laws working in disease are similar to those operating in health, though subject to different conditions, and he made important discoveries concerning various diseases. These and many other achievements in his special field give him undisputed claim to the title of "father of modern pathology."

Virchow was the son of a small farmer and shopkeeper of Schivelbein, Pomerania. He attended the common school in his native village, later was a pupil at the gymnasium in Köslin, at the age of seventeen went to Berlin to study medicine, and in 1847 became lecturer in the University of Berlin. His brilliant work in the study of diseases had already gained for him a reputation, and he was shortly commissioned by the German government to investigate the cause and cure of typhus fever in Silesia. At the same time he founded the periodical of which he remained the editor until his death, and which became famous the world over under the name *Virchow's Archives.*

The political disturbances of 1848, the year of revolutions throughout Europe, widened his sympathies and his interests, but his too ardent friendship for the reform element cost him his university position, and he found it advisable to retire to Würzburg. The following year he accepted a call to the chair of pathological anatomy in the University of Würzburg, achieving in this position such renown that he was recalled to Berlin in 1856, where he made the department of pathology the most famous of its kind in Europe. His field of activity continued to widen. In 1859, as member of the Municipal Council of Berlin, he vigorously opposed the despotic police system then in vogue, and three years later, having been elected to the Prussian Diet, he rose to the leadership of the opposition in that body. From 1880 to 1893 he was a prominent figure in the German Reichstag.

Virchow's medical talent and knowledge were placed at the disposal of the government in the war with Austria in 1866 and in the Franco-German War of 1870-1871. When peace was restored in 1871 he turned his attention to the sewage problem of Berlin, and under his direction sewage farms were established of such magnitude that they meet the needs of the city at the present time, while the revenue derived from them is sufficient to pay the cost of operation. Virchow was also a distinguished archaeologist, and was able to be of great service to Schliemann in the latter's researches in Hissarlik and in the plains of ancient Troy (see ARCHAEOLOGY). B.M.W.

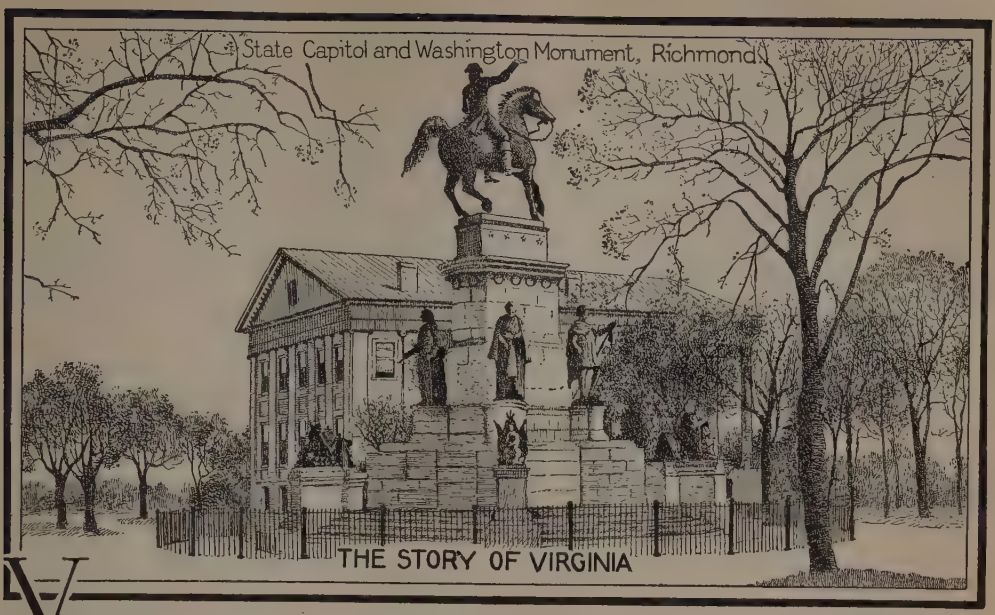
**VIR'DEN,** a town in the southwest corner of Manitoba. It is on the main line of the Canadian Pacific Railway, forty-seven and a half miles west of Brandon, and is the point at which the Brandon-Saskatoon line branches from the main line. It is also the terminus of a branch of the Canadian Northern Railway. The town ships considerable grain, and its five elevators, with a total capacity of 200,000 bushels, are conspicuous features. Two machine shops, a creamery, pump factory and the town's acetylene gas works are also noteworthy. Population in 1911, 1,500; in 1916, about 2,000.

**VIREO,** *vir'e o,* a family of very small, insect-eating birds, keeping closely to foliage, and from their greenish color commonly known as *greenlets.* They are found only in America, and are especially abundant in the tropics. A

RED-EYED VIREO

few migratory species reach the United States and Canada. The best known of these is the *red-eyed vireo,* distinguished by a conspicuous white line with a black border over its red eye. From its continually repeated conversational note, this vireo is often called the *preacher bird.* It builds a neat, cup-shaped nest which it suspends from a forked branch. The eggs are white, with a few dark specks or spots. They are three or four in number.

**VIR'GIL.** See VERGIL.




VIRGINIA, *vir jin' i a,* the northernmost state of the South Atlantic group of the United States. It was the earliest permanent English colony in America, and at one time the term *Virginia,* given by Sir Walter Raleigh to this colony in honor of Elizabeth, the "Virgin Queen," was applied to much of the southern coast region.

Virginia is distinguished as the birthplace of eight of the country's Presidents, a greater number than have been born in any other state, and well may be called the "Mother of Presidents." Because it has given to the Union not only these Presidents, but such statesmen as Mason, Henry, Marshall, Randolph and Clay, and because it at one time embraced the territory from which were created the Northwest Territory and the states of Kentucky and West Virginia, it has earned the title of "Mother of States and Statesmen." In early documents the colony was alluded to as the "Colony and Dominion of Virginia" and later as the "Dominion of Virginia," or merely the "Ancient Dominion," hence the state is popularly known as the OLD DOMINION.

**Size and Location.** In shape Virginia is roughly triangular, with the apex to the north; Maryland, Chesapeake Bay and the Atlantic are on the northeast and east; North Carolina forms a horizontal base on the south; and West Virginia and Kentucky bound the sloping side on the west. Having an area of 42,627 square miles, of which 2,365 square miles are water, it ranks thirty-fifth in size and is a little less than twice the size of Nova Scotia. It is considerably larger than two of its northern neighbors, West Virginia and Maryland, combined.

**The People.** The population has steadily increased with the industrial development since the close of the War of Secession. On January 1, 1917, the number of inhabitants was estimated by the Census Bureau to be 2,202,522; in 1910, with a population of 2,061,612, it ranked twentieth in population among the states. The average density of the population was 51.2 per square mile, as compared with 30.9, the average number per square mile in the United States. Over thirty-two per cent of the population were negroes, this proportion being slightly smaller than that which had existed for the previous 150 years. The negroes are still indispensable as field laborers in the plantations of Eastern Virginia and are also employed as factory hands. As freemen they have made some progress, and many have acquired small farms of their own. Of the foreigners, the Germans, Irish, English, Russians, Italians and Scotch are most numerous.

Although the number and size of the cities and towns have recently increased, in 1910 over three-fourths of the population still lived in rural communities. Richmond, the capital, is the largest city, and in 1916 had an estimated population of 156,687. Norfolk, Roanoke, Portsmouth, Petersburg, Danville and Lynchburg are other important cities.

More than half of the inhabitants of the state are members of the Baptist Church; about one-fourth are Methodists, and the remaining fourth are chiefly of the Presbyterian, Roman Catholic and Episcopal faiths.

**Education.** Although there were state funds for the education of the children of the poor whites, there were no regular free schools in Virginia before the War of Secession. In 1870 a public school system was established for the education of both white and colored children. The system was under the direction of a board of education consisting of the governor, attorney-general and superintendent of public instruction. In 1902 three experienced educators elected by the senate and one city superintendent and one county superintendent were added to the board, and since that date the state superintendent has been elected by the people instead of by the legislature. There is a compulsory-education law, and in 1910 fifty-six per cent of the total school population was enrolled in schools. In this same year 15.2 per cent of the total population was unable to read and write, but this is a lower percentage than the average for the South Atlantic states.

Departments of agriculture, domestic science and manual training have been established in the high schools. Virginia has led the states in the formation of school and civic leagues in rural school districts. Coöperative educational associations are organized by the citizens to work with the state department of education in the improvement of school buildings.

Among the institutions of higher education supported by the state are William and Mary College, founded at Williamsburg in 1693, and with the exception of Harvard the oldest institution of learning in the United States; the state university at Charlottesville, established in 1819 by Thomas Jefferson; the Virginia Polytechnic Institute at Blacksburg; the Virginia Military Institute at Lexington, called the "West Point of the South;" a normal school for white teachers at Farmville and one for negroes at Petersburg, and industrial schools for women at Harrisonburg and Fredericksburg. The Medical College of Virginia at Richmond is partially under state control, and the Hampton Normal and Agricultural Institute, an industrial school for negroes and Indians, is aided by the state.

OUTLINE MAP OF VIRGINIA

Showing boundaries, navigable rivers, chief cities, mining locations, and the highest point of land in the state.

Among the many private colleges are Washington and Lee University at Lexington, Randolph-Macon Woman's College at Lynchburg, Roanoke College at Salem, Hampden-Sidney College near Farmville, Emory and Henry College at Emory, Bridgewater College at Bridgewater, Fredericksburg College at Fredericksburg, Virginia Christian College at Lynchburg, and a Baptist college for negroes at Richmond. There are also academies and seminaries for both boys and girls.

**Institutions of Charity and Correction.** All county, municipal and private as well as state institutions of charity and correction are under the control of a state board. State institutions include hospitals for the insane at Williams-

burg, Marion and Staunton, the first being the oldest in the United States; an asylum for insane negroes and a state hospital at Petersburg; an epileptic colony and institution for the feeble-minded at Madison Heights; a state farm at Lassiter; a school for the deaf, dumb and blind at Staunton; an institution for the colored deaf, dumb and blind at Newport News; Catawba Sanatorium at Catawba, and a penitentiary at Richmond.

**The Land.** The state is divided into three principal sections, varying in industries and resources.

The low shores of "Tidewater Virginia" are cut into many peninsulas by the tidal estuaries of Chesapeake Bay. The shells and animal remains imbedded in the soil show that the sea once covered all of this section. Chesapeake Bay and its broad estuaries are thus drowned river valleys, the Bay being the finest example of this formation in the world. The long, narrow neck lying between the Bay and the Atlantic, known as the "Eastern Shore," is nowhere more than twenty or thirty feet above sea level. On the Atlantic coast, sandy beaches enclose salt marshes and lagoons, and many shallow bays penetrate the west shore. Skirting the west shore of the Chesapeake, particularly in the Southern counties, there are dense forests of pine, cedar, juniper and cypress, and in the extreme south is the great Dismal Swamp. From the low shores the land gradually rises to the "middle country," a region of rolling white hills carved by the deep channels of rivers and devoted chiefly to tobacco raising. On the west the gently undulating fields merge into the low, broken ranges of "Piedmont Virginia," which rises at the foot of the Blue Ridge Mountains.

Between the domelike peaks of this beautiful mountain range, the rivers have cut deep gaps, or notches, which are bordered by forest-clad slopes. The notch through which the Potomac flows at Harper's Ferry is one of the many beautiful spots in this region, famous for its scenic splendor. Toward the south, the range expands into a broad plateau and the peaks become higher, White Top, near the Tennessee border, rising 5,530 feet above the sea.

Between the Blue Ridge and the Alleghany Mountains lies the garden spot of the state, the famous Valley of Virginia, through which flow the Potomac, Shenandoah, James, Roanoke and the Kanawha, or New, rivers, more than a thousand feet above the sea. In the detached mountain spurs there are many very beautiful scenes, including Luray Caverns and the Natural Bridge, the latter considered one of the wonders of the world.

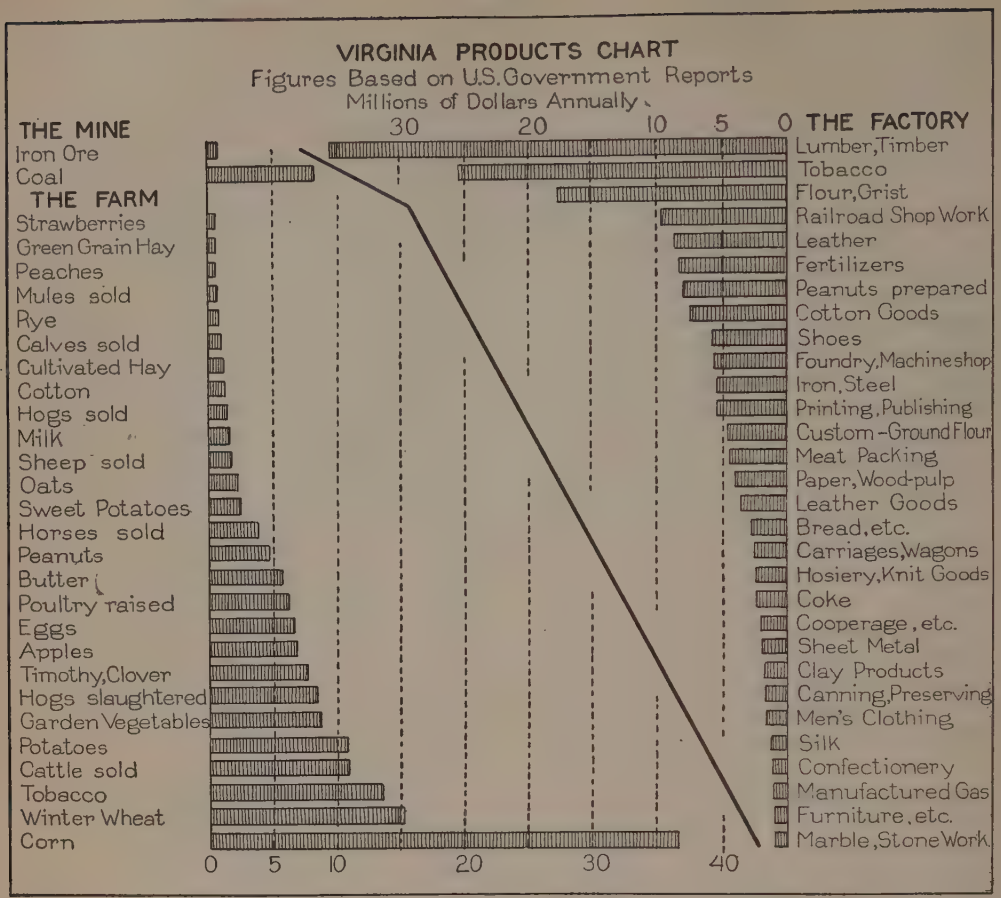
A range of the Alleghany Mountains, rugged and carved with deep ravines, separates the great valley from Kentucky. The Alleghanies are covered with fine timber, and their fertile valleys and mineral wealth are building up important industries in this section. The natural beauty and mineral springs attract many visitors.

**Rivers and Lakes.** The eastern and larger part of the state is drained into the Atlantic and its great arm, Chesapeake Bay, by rivers which rise in the western mountains and cross the state in a general southeasterly direction. The most important river within the state is the James, which, rising in the Alleghanies, breaks through a gap in the Blue Ridge and descends in a fine cascade known as Balcony Falls. It empties into the foot of Chesapeake Bay in a tidal estuary. Other large rivers emptying into the Chesapeake are the Potomac, forming the boundary with Maryland and fed by the North Branch, the South Branch and the Shenandoah; the Rappahannock; the Mattapony and the Roanoke.

The larger rivers are navigable into the heart of the state; at the head of their tidal waters are Virginia's largest cities, and at their broad mouths are splendid harbors. The landlocked harbor of Hampton Roads, at the outlet of the James River, is large enough to hold the navies of all the great nations and is one of the finest harbors in the world. In the Blue Ridge and Piedmont regions, the streams tumble over rocky ledges in short falls and develop power of great value, which is as yet not fully utilized.

The southwestern part of the state is drained by the New River, which flows across the mountains to the Ohio, and by the Holston, Clinch and Powell rivers, which flow southwest to the Tennessee.

Virginia's only large inland body of water is Lake Drummond, which lies in the heart of Dismal Swamp. The water of the lake is amber-colored, and since it is known to keep pure for long periods of time, it is used by many vessels leaving Portsmouth for extended voyages. The dreary swamp enclosing the lake is so densely overgrown with trees that there is little underbrush, and the falling leaves and branches which have been accumulating for centuries have formed a bed of black peat twenty or thirty feet deep.




**Climate.** The climate of Virginia is mild and equable, owing to the numerous arms of the sea which penetrate the coast. The western mountains form a barrier, shutting out the violent wind and rain storms from the northwest. The temperature gradually becomes cooler toward the west, and though some of the poorly-drained swamp regions in the tidewater section are hot and malarial, the climate in the "middle country" and western sections is healthful and delightful. The mountains, where the summers are cool, are the summer resorts of the state, and at the foot of Chesapeake Bay, notably at Old Point Comfort, there are famous ocean resorts. The rainfall, averaging forty-four inches annually, is abundant in all parts of the state.

**Agriculture.** Owing to the mild climate, long summers and abundant rainfall, agriculture is the leading industry of the state. The soil of the eastern shore and of the tidewater section is a fertile marl especially adapted to the growing of vegetables, and extensive truck gardens occupy this part of the state. Peanuts are an important product of this region and many other parts of the state, North Carolina alone among the states having a larger crop.

The great tobacco plantations which have been so important in Virginia's history are in the central section, the southern counties being part of the famous "golden tobacco belt," where the finest tobacco in the United States is grown. In the output of tobacco, Virginia ranks third among the states, Kentucky and North Carolina being first and second.

The Piedmont region is the orchard of the state, the middle counties being famous for the Albemarle pippins. On the mountain slopes there are extensive vineyards and grazing lands, and in the great valley large crops of corn, wheat and other cereals are grown.

The principal crops of the state, in order of their value, are corn, wheat, hay and forage, most of which is timothy and clover, tobacco, potatoes, other vegetables, including sweet potatoes, and peanuts. The cotton fields cover

only about 36,000 acres; the crop of cotton is smaller than that of any other Southern state. Besides apples, of which two million to five million bushels are annually produced, peaches and other orchard fruits are raised. Strawberries are the most important small fruit. Dairying and the raising of live stock, especially the breeding of fine horses, are important in the hilly regions, where the blue grass flourishes. Agricultural experiment stations have been established, and demonstrations are conducted by the state.

**Forests.** About one-half of the land area is woodland, which furnishes the raw material for the chief manufacturing industry of the state. The eastern and middle counties produce the greater part of the yellow pine, the principal lumber of the state, and oak, walnut, hickory and other hardwood timbers supply a great number of sawmills and factories in the western sections. Lumbering is one of the state's oldest industries; in 1608 a cargo of cedar posts and walnut boards was sent to England, and by 1630 sawmills were in operation. There are over 283,800 acres of national forests in the western mountains and in the great valley. In 1915 the office of state forester was created.

**Fisheries.** In the sheltered waters of Chesapeake Bay and the tidal rivers are the largest oyster beds in the world. The Bay furnishes four times as many oysters as all other places on the United States coasts. The oysters found in Lynn Haven Bay, east of Hampton Roads, are the most highly prized. Other sea foods, including shad, menhaden, clams, alewives, crabs, croaker and bluefish, are caught, but over two-thirds of the income from the fisheries products represents the value of oysters.

**Minerals.** The extensive and varied mineral resources of Virginia are still largely undeveloped. The coal fields cover 1,750 square miles, principally in the western counties. The annual output is steadily increasing and now exceeds 7,000,000 long tons, placing Virginia among the ten leading coal-producing states in the Union. The field of bituminous coal southwest of Richmond was the earliest worked coal field in the United States, and it supplied Philadelphia before the great mines of Pennsylvania were opened. Its richness, however, was practically exhausted by the middle of the nineteenth century. Stone products, including talc, soapstone, marble, granite and other building stones, are second in importance among the mineral products of the state. Clay products and lime rank third and fourth respectively among the state's mineral products, and iron is produced in considerable quantities, the state being surpassed by only six states in the output of this metal.

The mining of salt has long been important in the southwest corner of the state and in the great valley. Sand and gravel, pyrite, copper, zinc and lead are produced, and gypsum, asbestos, mica, feldspar and arsenic are found in small quantities. There are many mineral springs, noted for the medicinal value of their waters, and such well-known health resorts as Virginia Hot Springs have grown up around them. Over 2,900,000 gallons of these waters are annually sold, adding no small item to the total value of the mineral products, which annually exceeds $16,000,000.

**Manufactures.** Virginia has entered upon a period of industrial growth. The water power in the Piedmont region, the abundance of raw materials from the field and forest, cheap water transportation and good harbors are contributing to the rapid industrial development.

The lumber and timber products are the most important of the manufactures, and mills and factories are located in all parts of the state. Tobacco products are second in importance, and next to New York City and Saint Louis, Mo., Richmond has the largest tobacco industry of any city in the United States. The milling of flour and grist, the building of cars and general shop construction, the tanning of leather, the manufacture of fertilizer and the grinding and roasting of peanuts are other large industries. In the last-named, the state outranks all others in the Union. Newport News, on Hampton Roads, has become one of the country's greatest shipbuilding centers and has one of the largest shipyards and dry docks in the United States. Here the great United States battleship, the *Pennsylvania,* was launched in the spring of 1916, and many other dreadnaughts in the United States navy and large ocean steamers have been constructed in these yards. In boat building Virginia ranks third among the states, the industry being larger in New York and New Jersey.

Cotton goods and boots and shoes are among the leading manufactures, and foundries and machine shops are important in the western cities. Richmond and Norfolk are the chief manufacturing centers.

**Transportation and Commerce.** Virginia has over 4,700 miles of steam railroads, which extend into almost every section of the state. The principal lines are the Norfolk & Western,

the Southern, the Chesapeake & Ohio, the Virginian, and the Seaboard Air Line. Besides these, there are several shorter lines and over 500 miles of electric railway. Public roads cover more than 43,300 miles, but only about 4,480 miles of these roads are surfaced.

Water transportation is excellent in the eastern part of the state. The broad-mouthed rivers are navigable as far as the rapids at the Fall Line of the Piedmont. Steamship lines connect the ports and large cities at the head of the tidewater estuaries with Baltimore, Washington, New York, Boston and Savannah and foreign ports.

Large quantities of lumber, grain and naval stores are shipped from Norfolk, which is the third cotton port in the Union. The enormous coal product of West Virginia and Virginia has its chief port at Newport News, at the mouth of the James River.

## *Government and History*

**Government.** Virginia has had five state constitutions, adopted in 1776, 1830, 1851, 1869 and 1902. The voter must be a resident of the state for two years; of the county, city or town one year; and must have paid poll taxes for the three years preceding the election, unless he is a veteran of the War of Secession.

The *executive* department consists of a governor, lieutenant-governor, secretary of the commonwealth, treasurer, superintendent of public instruction and commissioner of agriculture, elected for four years.

The *legislative* body is the general assembly, which consists of a senate of thirty-three to forty members and a house of delegates of ninety to one hundred members. The state is divided into districts according to population, and senators are elected from each of these for four years and delegates for two years. The general assembly meets biennially. Bills of private or local interest must be referred to a special committee of five members appointed by the senate and seven members appointed by the house of delegates.

The *judiciary* consists of a supreme court of appeals, circuit courts, one in each of the twenty-four judicial districts, and city courts. The twelve supreme court judges are elected by the joint vote of the two houses of the legislature for terms of twelve years; circuit judges and city judges are elected in the same way for eight years.

**The Founding of the Colony.** The territory of Virginia was discovered by Sebastian Cabot in 1498 and claimed by England. The first attempt at settlement was made by the Spaniards in 1526, but they soon abandoned the Virginia shores. In 1585 Sir Walter Raleigh was granted the territory by Queen Elizabeth; he sent several expeditions to establish a colony, but all returned without success.

The first permanent settlement was made by the London Company in May, 1607, at Jamestown. Under the able leadership of Captain John Smith the colony escaped destruction by famine and Indian attacks.

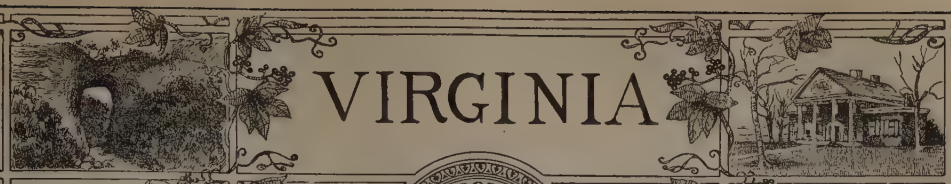
**Colonial History.** In 1619 occurred two of the most important events in Virginia's history, the introduction of negro slavery by Dutch traders and the establishment of the house of burgesses. This was the first representative assembly in America, and during the colonial period was the protector of the rights of the people against royal encroachments. After the Civil War in England, royalists poured into the colony and obtained positions of authority. Their administration was overthrown in 1676 in an insurrection known as Bacon's Rebellion.

Virginia took a conspicuous part in colonial politics and furnished some of the most prominent generals in the French and Indian and Revolutionary wars. The freedom of the colonies was gained on Virginia soil, when Lord Cornwallis surrendered at Yorktown in 1781.

**Statehood.** Seven of the first twelve Presidents of the United States were from Virginia, as were many other statesmen prominent in shaping the destiny of the Union. The tobacco culture continued to grow, and the number of slaves steadily increased. The Blue Ridge Mountains divided the state into two regions differing in the character of the population, in industry and in sentiment. At the crisis in 1861 the inhabitants west of the Alleghanies, who were not large land and slave owners, refused to secede with Virginia, and formed the state of West Virginia, which was admitted into the Union in 1863.

During the War of Secession Richmond was the capital of the Confederacy; the home of Jefferson Davis, which is now a Confederate museum, was the "White House" of the South. The state again furnished the commander-in-chief of an army—Robert E. Lee—and was the home of many of the ablest Confederate generals. It became a main battle ground of the

# VIRGINIA



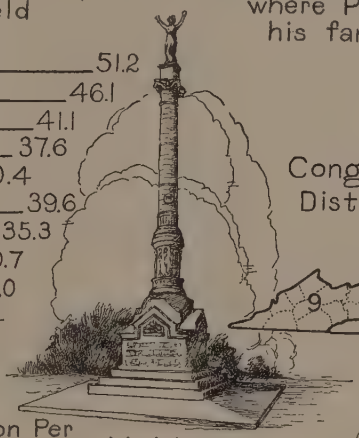
State Seal

Washington's Birthplace at Wakefield

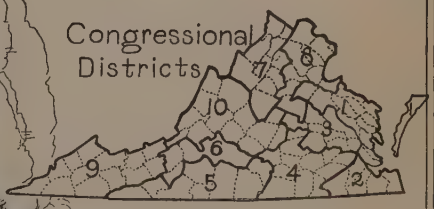
St. John's Church, Richmond, where Patrick Henry made his famous speech

| | |
|---|---|
| 1910 | 51.2 |
| 1900 | 46.1 |
| 1890 | 41.1 |
| 1880 | 37.6 |
| 1870 | 30.4 |
| 1860 | 39.6 |
| 1850 | 35.3 |
| 1840 | 30.7 |
| 1830 | 30.0 |
| 1820 | 26.4 |
| 1810 | 24.2 |
| 1800 | 21.8 |
| 1790 | 18.5 |

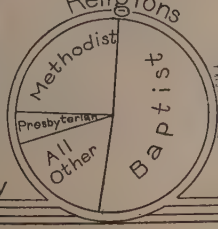
Increase in Population Per Sq. Mi. By Decades.

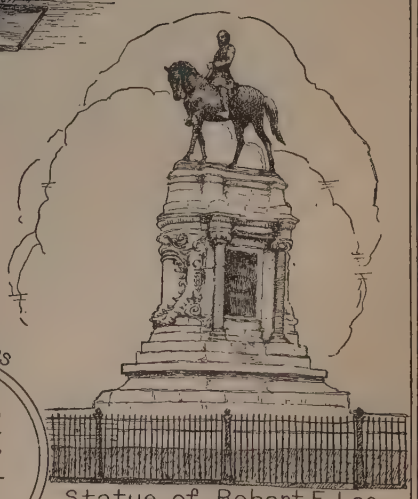


Yorktown Centennial Monument



General Lee's Home, 1861-1864, Richmond; now Virginia Historical Society



Statue of Robert E. Lee, Richmond

# *RESEARCH QUESTIONS ON VIRGINIA*

**(An Outline suitable for Virginia will be found with the article "State.")**

Where is the "Bottomless Pit," and of what natural wonder does it form a part?

Who said, "I thank God there are no free schools nor printing, and I hope we shall have none these hundred years?"

In whose honor was this state named, and by whom?

What right has this state to be called the "Mother of Presidents" and the "Mother of States and Statesmen?"

Name two great generals and two great statesmen who were born within the borders of this state.

Upon how many states does this state border? How many of these bordering states are larger than Virginia?

How does each of these boundary states compare with Virginia in number of inhabitants? In density of population?

Why is the water from Virginia's largest lake frequently carried by ships setting out on long voyages?

What state most closely resembles Virginia in area? (See table in article UNITED STATES.) How do the two compare in population?

When were the first regular free schools established in this state?

How does Virginia's oldest institution of higher learning rank as to age among the institutions of the United States?

What and where is the "West Point of the South"?

What is the finest example of a drowned river valley in the world?

What is the Eastern Shore, and what is its greatest elevation?

What and where is the Piedmont Region, and for what crops is it especially suited?

What two great historic conflicts were brought to an end within the borders of this state? Where did the concluding events of these struggles take place?

Mention four great battles that took place in Virginia, and give a brief sketch of each.

Who was the "Father of Virginia," and how did he win the right to the title?

What nation first laid claim to the territory which constitutes Virginia, and on whose discoveries was the claim based?

Where was the first permanent English settlement in the United States located? Give a brief sketch of its history.

Describe a Natural Bridge. In what sense is it a memorial to some of the greatest Virginian statesmen?

Where is there a great peat bog in Virginia? How was it formed?

What effect does the sea have on the climate of this state? Do the mountains tend to neutralize or to strengthen this effect?

For what is Newport News chiefly noted? How does the state as a whole rank with regard to this industry?

What is the railway mileage to each hundred square miles of area? How does the state compare in this respect with the states upon which it borders?

What great Virginian's home may become a country home for the Presidents?

How many states of the Union are larger than Virginia? How many of them have a larger population?

struggle, and the encounters at Manassas, Fredericksburg and Chancellorsville and the burning of Richmond were among the most important events in the war. This great struggle, like the Revolution, was concluded within Virginia's borders, the surrender of General Lee taking place at Appomattox.

**The New Era.** After the period of Reconstruction and Virginia's readmission into the Union in 1870, the state's industrial growth began. The southwestern section developed into an important mining region; new cities were established, and Norfolk and Newport News became commercial rivals of the Northern ports. In 1902 a new constitution was adopted limiting suffrage. Statewide prohibition went into effect in 1916.

**Other Items of Interest.** In Augusta County is a great cavern which rivals Mammoth Cave and Wyandotte Cave in beauty and interest. It is called Weyer's Cave, for its discoverer. Its chief beauty consists in its remarkable display of stalactites, but it has as well fountains and geysers, cascades and miniature craters. The Ghost Chamber and the Bottomless Pit are names which have been given to parts of the cavern.

Norfolk is the greatest peanut market in the world.

Many prominent men, among them Jefferson and Clay, cut their initials in the stone of the Natural Bridge; and the residents of the neighborhood point proudly to a faintly scratched "G. W.," which they declare, though without real proof, is the mark of Washington.

John Smith is often referred to as "the Father of Virginia."

Monticello, the estate of Thomas Jefferson, is in Albemarle County, about three miles east of Charlottesville. The mansion is on the summit of a hill—the name means *little mountain*—and commands a view of a picturesque and beautiful country. Since 1915 a movement has been on foot for the purchase of the estate by the Federal government, and the owner, Jefferson M. Levy of New York, expressed himself as willing to sell on condition that the mansion should not be made a museum but should serve as a country home for the Presidents.

Sir William Berkeley, a colonial governor of Virginia, once declared, "I thank God there are no free schools nor printing, and I hope we shall have none these hundred years." E.B.P.

Consult Cooke's *Stories of the Old Dominion;* Wertenbaker's *Virginia under the Stuarts (1607-1688);* Claiborne's *Seventy-five Years in Old Virginia;* Page's *The Old Dominion: Her Making and Her Manners.*

**Related Subjects.** Much material that is of interest in connection with a study of Virginia may be found in the following articles:

CITIES

Alexandria
Bristol
Danville
Lynchburg
Newport News
Norfolk
Petersburg
Portsmouth
Richmond
Roanoke
Staunton

HISTORY

Bacon's Rebellion
Bull Run, Battles of
Burgesses, House of
Chancellorsville, Battle of
Fredericksburg, Battle of
Harper's Ferry
Jamestown
Revolutionary War in America
Smith, John
War of Secession
West Virginia, subhead *History*
Yorktown, Siege of

LEADING PRODUCTS

Apple
Coal
Cotton
Oyster
Pyrite
Tobacco

RIVERS

James
Potomac
Rappahannock
Roanoke
Shenandoah

TOPOGRAPHIC FEATURES

Alleghany Mountains
Blue Ridge
Fall Line
Luray Caverns
Natural Bridge
Piedmont Region

**VIRGINIA,** MINN., a mining city in Saint Louis County, situated in the northeastern part of the state, twenty-two miles east of Hibbing, seventy-five miles northwest of Duluth and 222 miles north of Minneapolis and Saint Paul. Transportation is provided by the Duluth & Iron Range, the Duluth, Missabe & Northern, the Duluth, Winnipeg & Pacific and the Great Northern railways. Virginia is a distributing point for a rich lumber, dairy and mining district, the iron mines of the Mesaba and Vermilion ranges in the vicinity being among the most productive in the world. The sawmills employ about 1,800 men; the dairy industry is developing rapidly. Virginia has a Federal building, a courthouse, a technical high school which cost $200,000, a library, a business college, and a fine First National Bank Building, constructed at a cost of $100,000. The place was settled in 1892, and became a city in 1905. It was twice burned by forest fires, in 1893 and in 1903. The population increased from 10,473 in 1910 to 15,193 in 1916, the latter a Federal estimate. T.H.M.

**VIRGINIA,** UNIVERSITY OF, a state institution of learning located at Charlottesville, four

miles from Monticello, the home of Thomas Jefferson. It is one of the most important educational institutions of the South. The school was founded by Jefferson, who planned and personally supervised the erection of the first buildings. It was chartered in 1819 and began sessions in 1825. All the additions to the original campus have been in close harmony with the first classic plan. At the northern end of the large quadrangle, 1,000 feet long and 300 feet wide, Jefferson built the Rotunda, following closely the construction of the Pantheon at Rome. This building now houses the university library, which contains about 90,000 volumes.

The university is organized into academic, engineering, law, medical and agricultural departments, comprising twenty-four schools. It is given an annual appropriation of $98,000 by the state, and has received many liberal gifts. There are about 110 instructors and over 1,000 students. During the summer session the registration exceeds 1,300.

**VIRGINIA CITY,** Nev., third city in size in the state, but with only 2,244 inhabitants in 1910. As an early mining camp it bore the names of Ophir and Washoe, and was given its present name in memory of one James Finney, known widely as "Old Virginia."

The town is the county seat of Storey County, and is fifty-one miles southeast of Reno, the state's largest city. It is served by the Virginia & Truckee Railroad. Here was the location of the Comstock Lode, the world's richest silver mine in the years following 1860. The output since that date is close to $900,000,000.

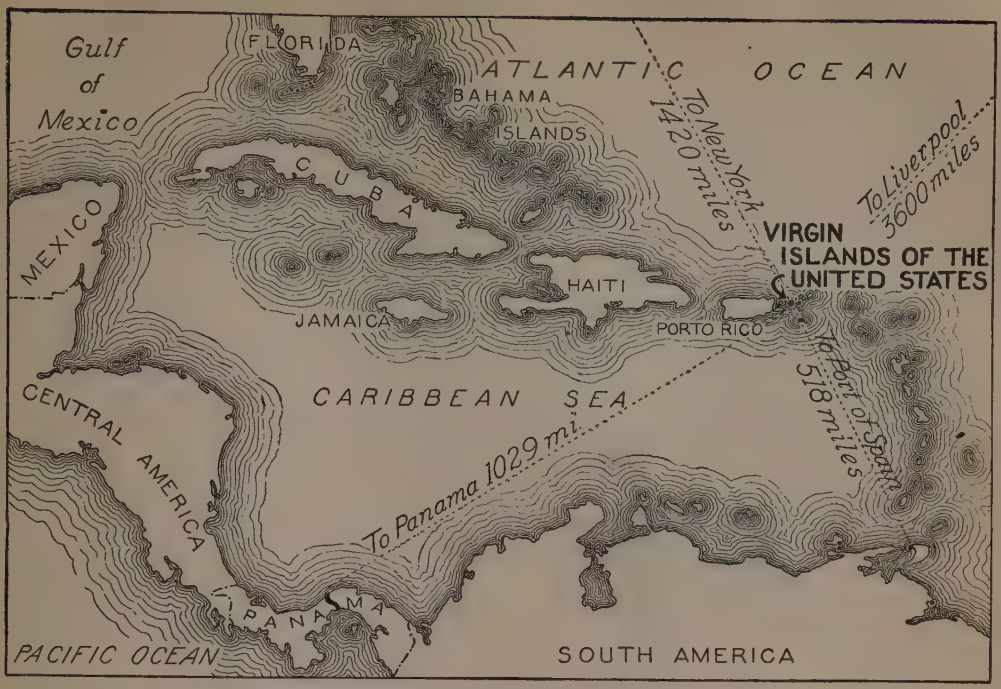
**VIRGINIA CREEP'ER,** a rambling, creeping vine of the grape family, found in almost all parts of America and often wrongly termed *woodbine*. The plant clings by strong but slender tendrils and with the aid of tiny disks; the latter form at the end of the stems, secreting a cementlike substance and fastening them securely. Experiments have shown that a single tendril with five branches bearing these disks would, even after ten years' exposure to all sorts of weather, hold up a weight of ten pounds. Virginia creeper resembles poison ivy, but the two may always be distinguished by a comparison of the leaves. Those of the poison ivy (see page 3090) are in three leaflets, and those of the Virginia creeper in five leaflets. In the autumn the Virginia creeper is a gorgeous sight, with its flaming foliage and bunches of dark blue berries, festooning walls and arbors. Other names for it are *false grape* and *American,* or *five-leaved, ivy.*

**VIRGINIA RESOLUTIONS.** See Kentucky and Virginia Resolutions.

**VIRGIN ISLANDS OF THE UNITED STATES,** a group of islands in the West Indies which were purchased from Denmark by the United States in 1917. They lie about forty miles east of Porto Rico, the hills of which are visible to the inhabitants of the islands on a clear day. The group, formerly known as the Danish West Indies, consists of three main islands—Saint Thomas, Saint Croix and Saint John—and a number of rocky islets. The islands have a combined area of 139 square miles and a population (chiefly negroes) of 30,000. Saint Croix, the largest, is sometimes called the "Garden of the West Indies." Its soil is well adapted to the cultivation of sugar, sea-island cotton and various other warm-climate plants; it is expected that American possession of the island will vastly stimulate its development. Saint Croix is about twenty-five miles long and from four to five miles wide, and has an area of eighty-four square miles. Its population is 18,000.

Saint Thomas (which see) is thirty-three square miles in area and has a population of over 10,000. This island, called by Admiral Porter "the keystone to the arch of the West Indies," is of importance as a commercial center rather than as an agricultural land. Charlotte Amalie, the only town on the island, has one of the finest harbors in the West Indies, and is picturesquely situated on three hills. The third island, Saint John, is but sparsely inhabited, and is awaiting development from America.

The Virgin Islands were purchased by the United States for $25,000,000, a large sum in proportion to their industrial importance, but not unreasonable in view of their strategic position. They will afford the United States an additional coaling station and port of call for ships bound for the Panama Canal, and they would prove of immense value to the government in case the Canal or Porto Rico are ever attacked by a hostile power. The people of the Virgin Islands, who are chiefly the descendants of freed negro slaves, are intelligent and agreeable, and very sympathetic toward American ideals. They enthusiastically favored the purchase of the islands, and recorded their wishes in the matter by a popular vote. English is spoken in the cities, but the natives use a Spanish dialect.




VIRGIN ISLANDS OF THE UNITED STATES

They are the key to the whole Caribbean area. The opening of the Panama Canal gave a new importance to them, for they stand where the steamer route from Europe to Panama crosses the route from New York to South America. Germany sought earnestly to acquire the islands and was much disturbed when their control passed to the American republic.

These islands will always be called the Virgin Islands, but their legal designation is as given in the first words of this article. B.M.W.

**VIRGINIUS MASSACRE,** *vir jin' i us mas' a ker,* an episode of President Grant's second administration which almost involved the United States in a war with Spain. In 1873, during a Cuban insurrection against Spain, a merchant ship called the *Virginius* was captured on the high seas near Jamaica by a Spanish man-of-war. The vessel floated the American flag and was commanded by an American citizen, Captain Fry. Its captors excused their act on the ground that the *Virginius* was preparing to land men and arms in Cuba to aid the rebels. The vessel was taken to the port of Santiago, and Captain Fry, thirty-six of the crew and sixteen passengers were executed by the Spanish authorities. Only the arrival of the British ship *Niobe* saved the rest of the prisoners. The affair caused great excitement and indignation in the United States, but hostilities were averted, as Spain agreed to surrender the ship and survivors, and to disclaim any intention to insult the American flag. It was discovered, after investigation, that the *Virginius* was unlawfully flying the flag. The vessel was wrecked and abandoned off Cape Fear on its homeward journey.

**VIR'GO,** or THE VIRGIN, a zodiacal constellation, now mostly in the sign of Libra, also the sixth sign of the zodiac, into which the sun enters about August 20. In astronomy the symbol is ♍, supposed to represent a wing.

The principal star in the constellation is Spica Virginis, of about second magnitude, nearly 10° south of the celestial equator. In illustrations Virgo usually represents Astraea, goddess of justice, holding the balance Libra on one hand and a sheaf of wheat in the other. Sometimes she is shown as representing the Egyptian goddess Isis, daughter of Earth and Heaven.

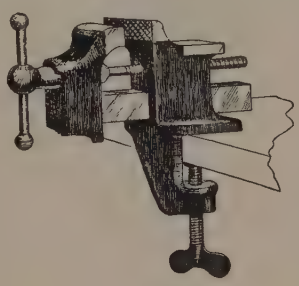
See drawing, *The Heavens in Spring and Summer,* page 444, in article ASTRONOMY.

**VI'RUS,** a medical term generally used in the sense of *disease poison.* It is applied usually to the poisonous substance produced in the body by a particular disease, which when transmitted to another person causes him to take the same disease. Examples are the infective agents which cause measles and smallpox. It is also customary to designate the material used in vaccination as *virus,* though

*lymph* is a more exact term. Generally speaking, the culture of any bacteria may be called a virus (see BACTERIA, page 539).

**VISCOUNT,** *vi'kount,* an English title of nobility next in rank to that of earl. The title was originally conferred upon the officer who acted as the earl's deputy, and it was first granted to John Beaumont in 1440. The viscount is addressed as "right honorable," his wife is styled "viscountess," and the children, both sons and daughters, are addressed as "honorable."

**VISE,** a tool used extensively by carpenters, blacksmiths, machinists, jewelers and others for holding tight, in one position, wood, metal or other material upon which work is being done. A vise has two jaws, one stationary and the other movable, worked by a screw, lever or cams. The article to be held is placed between the two jaws, and the screw, or tightening apparatus, is turned until the object is firmly clasped between the two jaws in the position required for working, such as filing or planing.



A VISE

Carpenters' vises are usually of wood, though large iron vises are sometimes used with padding of wood to prevent damage to the surface of the object on which work is being done. Machinists' and blacksmiths' vises are made of metal. Usually vises are mounted on a bench or table by means of a shank or plate, though small ones are made to be held in the hand, as is sometimes found most convenient by jewelers.

**VISH'NU** is the second god of the Hindu triad, the others being Brahma and Siva. In the *Vedas* he appears as a manifestation of the sun. He "establishes the vault of heaven," and "measures out the extreme places of the earth." In later times he was the god of the middle classes of India. Descending to earth to set right what was wrong, he assumed the form of some animal, or some superhuman or human being. In the human forms of Rama or Krishna he is worshiped by millions of Hindus. It is claimed that Buddha was an incarnation of Vishnu. He is represented with four hands, holding in one a conch shell blown in battle, in another a disk as emblem of supreme power, in the third a mace as the emblem of punishment, and in the fourth a lotus, the type of creative power. He is also represented sometimes as riding on Garuda, a being half bird and half man.

**VISIGOTHS,** *viz'i goths.* See GOTHS.

**VISION,** *vizh'un,* a term derived from the Latin word *videre,* meaning *to see,* and applied in physiology to the faculty of perceiving objects by means of the eye. In this sense it is synonymous with *sight.* The process of seeing is described fully in these volumes in the article EYE.

**VIS'TULA,** a large river of Europe, of especial importance to Poland because of its facilities for navigation. Its source is in the Carpathian Mountains in Austrian Silesia. It follows a circuitous course through Poland and West Prussia, and discharges by several branches into the Baltic Sea; the most eastern stream, the Nogat, discharges into the sound called Frisches Haff. The Danzig branch is the one principally used for navigation; lighter craft proceed as far as Cracow, where the river is about 300 feet wide.

The Vistula receives the waters of several navigable rivers, and its commercial importance is further increased by canal connection with the Oder, the Dnieper and the Niemen rivers. The construction of extensive engineering works was found necessary to regulate the discharge channels. The total length of the river is about 650 miles, and the area of its basin is about 76,000 square miles. The principal cities along its course are Cracow, Warsaw, Danzig, Thorn and Marienburg. See map, facing page 2092.

**VITRIOL,** *vit'ri ul,* OIL OF, the common name of strong sulphuric acid. See SULPHURIC ACID.

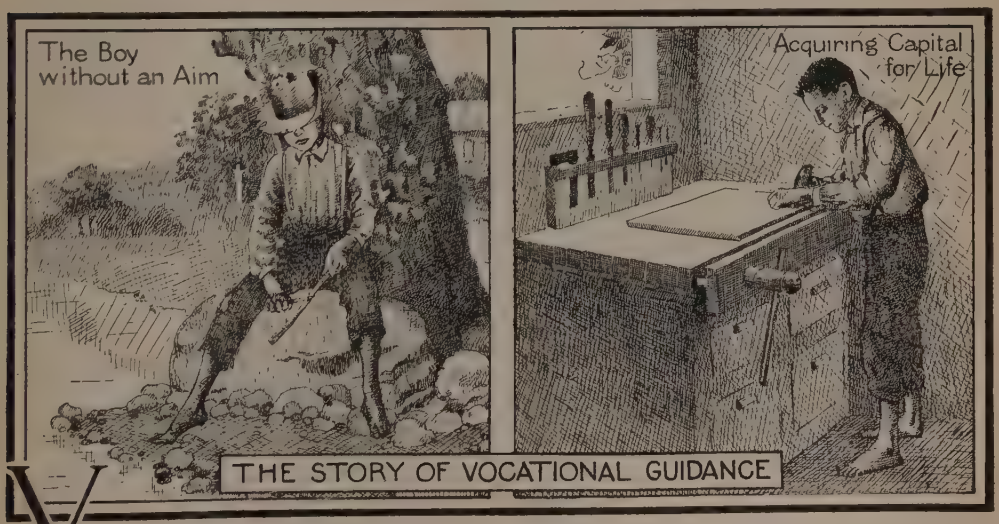
**VIVISECTION,** *viv i sek'shun,* a term meaning literally *the cutting of the living.* It is applied to the practice of operating upon living animals for the purpose of studying facts of interest to the physiologist. Though strictly applied to cutting processes, in general practice the term covers a wide variety of operations in which animals are used for experimentation, such as the administration of poisons and medicines, inoculation with disease germs, studies in temperature and dieting and the like.

Though objection is frequently made to vivisection on sentimental or humanitarian grounds, the good accomplished through this practice cannot be overestimated. The discovery of the antitoxin for the prevention and cure of diph-

theria, of the anesthetic properties of ether and chloroform, the knowledge that trichiniasis comes from eating underdone pork, that rats are carriers of bubonic plague, and that malaria and yellow fever are spread by mosquitoes are but a few of the victories of animal experimentation. In fact, there is scarcely any field of medical and surgical practice that has not been benefited and advanced by vivisection. Every effort is made to carry on these investigations in a humane way. The animals operated on are placed under the effects of an anesthetic, and, so far as possible, the investigations are made while the animal is unconscious. If there is any serious mutilation of the animal it is killed before it regains consciousness. See SURGERY.

**VIZIER,** *vi zeer',* the title of high officials in Mohammedan countries. The term is derived from the Arabic *wazir,* signifying *a bearer of burdens.* In the Turkish Empire the *grand vizier,* as the representative of the sultan, is the highest officer of the Empire. He commands the center of the army in battle, and is the only subject who is greeted with a blessing. He is further distinguished by his dress, consisting of velvet robe richly embroidered in gold and jewels, and a turban ornamented with diamonds; his emblem of authority is a seal bearing the name of the ruler, which is always worn on his bosom.

**VLADIVOSTOK,** *vla dye vahs tawk',* the chief Russian naval station in Asia, the capital of the Amur government of Siberia, and a fortified seaport, with one of the most beautiful harbors in the world. It is situated at the south end of a peninsula on an inlet of the Japan Sea (see map, opposite page 417). The first ground for the Trans-Siberian Railway was broken at Vladivostok in 1891, and it is the eastern terminus of the line. Steamer lines connect this port with Japan and Korea, with north Siberian ports, and with Seattle, Wash. The harbor of Vladivostok is kept open in the severe winter months by ice-breaking steamers. Government buildings, an Oriental institute and a museum are interesting features, and there are sawmills, breweries and manufactories of machinery, flour and bricks. During the War of the Nations vast quantities of war supplies were sent to Russia from the United States and Japan by way of Vladivostok and the Trans-Siberian Railway. Its growth is not rapid. Population in 1911, 91,464.




**VOCATIONAL GUIDANCE,** *vo ka' shun al gi' dans,* a term which relates to the intelligent direction of young people in the choice of their life work.

**Mortality in Early School Life.** Year after year children dropped out of the public schools by the thousands, but so gradual was this change that educators, noting only the small per cent out of a single room or grade, centered their attention on the remaining thousands in the schools, accepting the elimination as an economic necessity and unavoidable accompaniment of the entire educational scheme, and making little special effort except that of "moral suasion" to counteract it; and "moral suasion" had little effect.

When, however, statisticians began to compile and declare that scarcely more than one-fourth the pupils who entered the first grades ever reached the high school, that fully fifty per cent never went beyond the sixth grade, and that more than a million of such youths annually filled the ranks of industry, many of them totally unprepared for their work and possessing not even the rudiments of a common school education, it became evident that the seventy-five per cent had some claim on the school curriculum and the methods of school organization.

**Private Enterprise to Reach Youth in Industry.** Already a beginning had been made by the establishment of evening, trade and technical schools through the activity of two groups of agencies—philanthropists and social-improvement organizations working for the uplift of the individual and society, and corporations and industrial leaders seeking skilled workmen, a dearth of whom had followed the industrial revolution of the eighteenth century and the consequent decline of the old apprenticeship system. There was, however, a growing conviction that the public schools also had a share in this responsibility, and that boys and girls should be reached before leaving school and given some preparation for the work they were about to undertake.

**Manual Training in Public Schools.** Manual training had become a part of the course of study in the public schools, the cultural value of "hand training" had been accepted by educators, and this work had progressed from the secondary to the elementary schools; but the vocational viewpoint was absent, and the statutes of few, if any, states recognized the handwork as an essential part of the school curriculum.

**State Legislation for Vocational Education.** The startling statistics on the elimination of children from the early grades of the elementary schools indicated that neither private enterprise nor manual training was saving the day. As a result, the relation of the public school to vocational training became a matter of such serious consideration that within the last quarter of a century vocational education has been introduced into the public schools of many large cities, and several states have provided very definite vocational laws not only legalizing instruction in vocational and practical arts' subjects in the elementary and high schools, but in some instances making it mandatory.

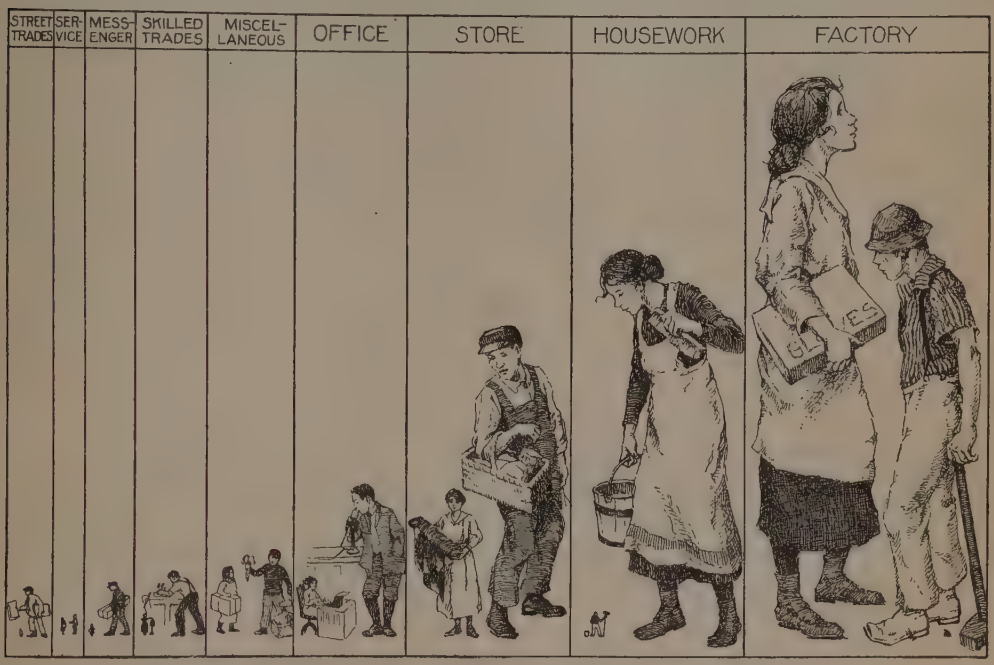
**Origin of Vocational Guidance.** In the beginning, in both private and public institutions, the purpose of vocational training was largely expressed in preparation for the immediate job. As this failed to lessen the mortality in the early years of school life or to bring needed industrial improvement, a broader conception of the purpose began to develop. It became clear that it was the function of the public schools not only to train, through evening and part-time classes, those eliminated early from the course, and to provide for all children training for vocations, but that it was also their function to direct children toward a vocational choice in accordance with their special aptitudes, and so link up their present school work with their future vocational needs as to make clear to them the relation of the school to their life careers and the need of continuing their relation to it as long as possible.

**Purpose of Vocational Guidance.** The main purpose of vocational guidance, as at present interpreted, is the guidance of pupils between fourteen and sixteen years of age, who have reached or passed the compulsory-age limit, and who, restless and self-assertive, are eager to become a part of the great body of world workers. Some of these drop out of school as soon as the compulsory-age limit is reached, and for them vocational guidance becomes supervision that follows them into industry and investigates the conditions under which they are employed. If part-time schools are in the system, the vocational-guidance agency endeavors to arrange with the employer for part-time work and study for these young people, to enable them to begin preparation for a vocation.

Other pupils continue two or more years in the high school. Through the vocational-guidance department these can be supplied with vocational information and their placement in wage-earning pursuits can be directed to some extent, and more in accordance with their tastes and abilities. A third group may properly benefit by vocational guidance, applied as educational guidance or supervision. These are the students who expect to attend higher institutions of learning; they may be assisted in selecting such schools, courses of study and subjects to be pursued as will best develop them in the lines of their vocational choice. The helplessness of college and university students in choosing life careers points to the early incorporation of vocational guidance in the courses for institutions of higher learning, at least until the work is more completely and universally

developed in the elementary and secondary schools.

In the complex and numerous vocational opportunities afforded by modern society, the problem of vocational guidance would be impossible were it to be considered as an effort to find a certain niche into which each individual must fit, for there are thousands of such occupational niches. But there are certain well-defined general groups that we recognize, as agriculture, commerce, industry, the household arts and the professions, with a few fairly definite subdivisions, and pupils may be helped to determine, in a measure, their special fitness for these.




RELATIVE PROPORTION OF WORKERS IN VARIOUS FIELDS

**Methods of Vocational Guidance.** Vocational guidance has worked through three channels; these are the giving of vocational information; the application of tests, both physical and mental, to determine the aptitude of children, and the placement and follow-up work, in industry.

Concerning the different vocations, pupils may be informed as to their nature, present-day conditions, personal and educational entrance requirements, dangers, advantages and disadvantages, and returns. They may learn of the conditions under which the various industries operate; their stability, hours of labor, wages, and whether the occupation is a purely local one. Such information is furnished through teachers, books, pamphlets and papers. The library is an excellent agency to be utilized in the spread of such knowledge. Men and women in different vocations may address the pupils in the school, explaining the elements essential to success in their special fields, the demands on the workers and other important facts growing out of their own individual experiences. Through the coöperation of the vocational-guidance department with the occupational life of the community, pupils are enabled to visit the industries and learn at first hand something of the nature of the occupations and the environments they afford.

The vocational abilities of pupils may be ascertained through physical and psychological tests. The Binet-Simon tests are used for general intelligence, and other tests are being devised to discover special aptitudes. Short vocational courses provided in the upper grammar grades or junior high school perform the double function of giving information as to the actual shop operations and of helping pupils to discover their own interests and aptitudes.

The placement and follow-up work of vocational guidance have been conducted in some places through experts known as coördinators, whose business it is to keep in touch with the changing industry and seek the placement of pupils in accordance with their best abilities.

Without such special agent, this is a difficult part of the work, because teachers are so remote from the actual workaday world that they know little of the conditions of industry and how to coöperate in the placement of young workers.

**Spread of Work in Vocational Guidance.** Statistics indicate that approximately 100 high schools, representing forty different cities, had in 1916 definitely-organized schemes of vocational guidance through vocational bureaus, vocational analysis, "trying out" vocational courses, regular visits to industrial plants and systematic courses in vocations. Most of these cities reported definite results. At least 145 cities in thirty different states have introduced some form of work in vocational guidance in their high schools.

In addition to the public schools, such organizations as the Association of Collegiate Alumnae, the Women's Educational and Industrial Union, the Y. M. C. A., the Y. W. C. A., chambers of commerce and municipal authorities are carrying on the work of vocational guidance through bureaus and departments established for that purpose.

In 1913, at the third national conference on vocational guidance, a National Vocational Guidance Association was organized. This association publishes and distributes among the members a monthly *Vocational Bulletin*. Some vocational-guidance state associations or sections of the regular state teachers' associations have been started, and the training of teachers for the work of vocational guidance has been inaugurated, at least for the summer terms, in about ten of the leading American colleges, universities and higher technical schools.

**Vocational Guidance and Industry.** Success in business means the minimum waste in time and in physical and productive energy. Economic losses occur through incompetent and unprepared employees, through unscientific methods of employment and labor upheavals. Employers are awakening to the fact that they have a large part in eliminating this waste by coöperating with the schools in vocational guidance, by using scientific methods of employment and by keeping accurate account of the loss of the industry through change of employees.

In some of the large concerns, a separate employment division is maintained, and the "hiring and firing" are no longer left to the whim of a foreman with little training in handling people. Through such special employment division, in touch with the entire business, workers failing in one department may be transferred to another and their aptitude thus be given a complete test. In this way does the industry rightly supplement the school in the work of vocational guidance.

In the Eastern part of the United States a school has been established to train employers in problems of training employees and testing their capabilities in different lines of work. Great corporations and department stores are either creating schools within their own domain for training and guiding the youth they employ, or they are coöperating with the schools to that end. A superintendent of a certain factory recently stated that not more than one in six of those employed remained in the work for twelve months, a distinct loss to employer and employee. Tests for discovering the skill with which certain types of work may be done have been devised for use in industry, with the result that, after eliminating the unfit, the number needed to turn out a certain amount of work is reduced to fifty or sixty per cent, the work itself improved, wages advanced and the workday shortened.

Only from industry itself, from the employers and employees, can accurate data on present-day vocations be ascertained. When industry appreciates how vocational guidance can lessen its economic losses, this coöperation will be more freely given.

**Vocational Guidance and the Parent.** There is no greater influence in the life of a child than that exerted by the home. The attitude of parents toward children in the different stages of growth determines in large measure not only their fitness for a definite part in the world's work, but the wisdom with which they choose such part.

Fortunately the type of parent who insists on "making a lawyer of John" or a "music teacher of Mary" is fast disappearing, and a step in advance has been made by the parents who incline toward letting the sons and daughters follow their own aptitudes in choosing life careers. Yet, when such aptitudes are interpreted as pointing to vocations that are of the parent's choosing, and education is directed in those lines, the conditions are not greatly improved.

Very young children think and talk about what they expect to do when they are men and women, and they frequently express in their "play" what appear to be vocational interests. But the period at which the real vocational in-

terest awakens and takes definite form is that from about twelve to sixteen or eighteen years of age, when the plasticity of childhood is giving way to the settled habits of the adult. It is a period when watchfulness, interest and care on the part of the parent should be at a maximum, and formal demands, aggressive methods and personal interference at a minimum. More than ever do boys and girls of this age need guidance, but it is an indirect guidance, one that is not continually in evidence.

The school, the home environment and the social world will all be determining factors in the final choice of a vocation, but that choice must be made by the individual himself; it never can be made for him. A parent becomes a helpful guide in the vocational life of his child to the extent that he makes for him an environment conducive to self-understanding and a better knowledge of his own interests and abilities.

This environment should furnish information concerning occupational opportunities and conditions. Some of the books, periodicals and papers that find their way into the household may be selected with reference to the information they contain, not about one or two vocations but about many vocations. A better understanding of the business side of life and the requirements for success in the different vocations may be obtained by actually visiting industrial plants and seeing the requirements and the conditions under which they operate. The father of Benjamin Franklin acted the part of a wise parent when he took his son to visit some of the industries in Boston that he might more intelligently make a choice of his life work.

Conversation in the home and the presence there of successful men and women from the vocational world, who may be plied with questions by the young people and with whom they may freely converse on vocational opportunities, will bring to the household a valuable store of vocational information.

Through the influence of the parent, wholesome forms of amusement and recreation may be provided for the young people of the household. This is the time a boy wants a shop in which to try his skill with tools. He is no longer satisfied with seeing the marvels of steam or the wonders of electricity; he wishes to be more intimately associated with these powers, to help in some way their mysterious manifestations, and he seizes upon every article about the household or the farm that will help him achieve this desire. The parent may make the great mistake of stopping this interference with the smooth routine of the household and offer no suitable substitute, or he may supply so much ready-made equipment that the boy is at no time left to his own resources.

To the parent, vocational guidance means an intelligent acquaintance with the young people of the household. It means the almost impossible feat of watching, impersonally, the developing physical and mental traits of his children, and then of creating a home environment that will enable these children to recognize their own tastes and abilities as a basis for their vocational choice. For such vocational guidance is needed a fund of good common sense and a keener appreciation of the fact that success in life cannot be measured by wealth or by political distinction, but by the accomplishment of a work that is the full expression of individual interests and aptitudes directed to the service of mankind.

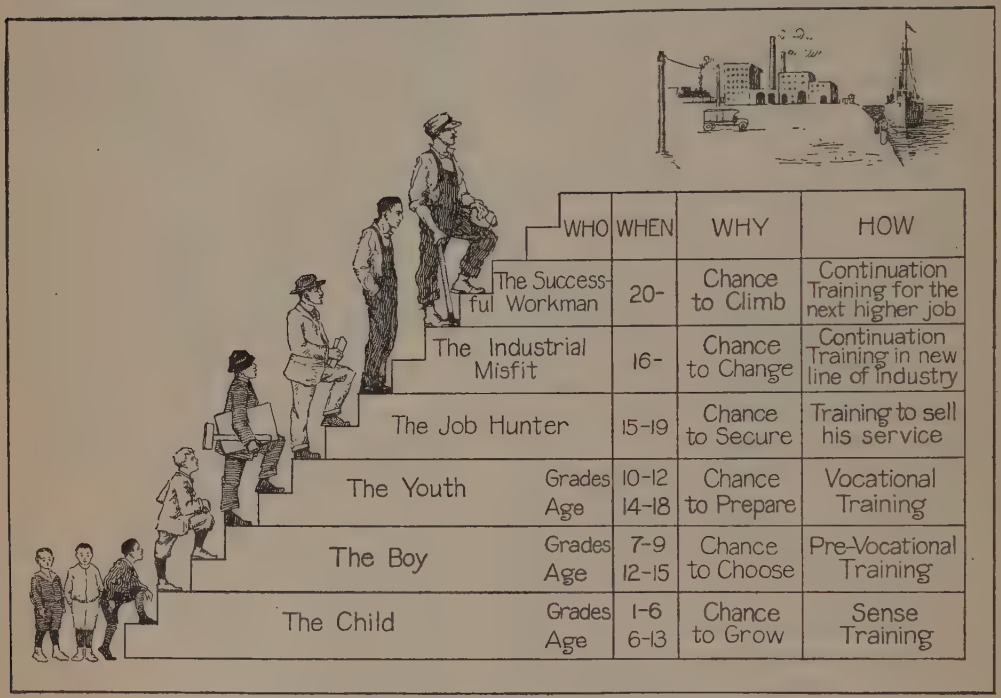
**The Future of Vocational Guidance.** Under present school conditions, vocational guidance will continue to function through the agency of special departments for that purpose and special experts trained to direct such work; but much improvement is needed in gathering accurate and important data, choosing from it the minimum essentials and placing these in suitable form for school and general use. Better physical and mental tests must be devised. The tests utilized in examining applicants for the army, navy, marine and aviation corps may aid materially in the development of tests to discover vocational aptitudes. Greater care must be exercised in finding people of common sense and tact who understand children, who have industrial as well as pedagogical knowledge and minds capable of constructive research, to undertake the work of vocational guidance.

More and more will vocational guidance permeate the entire school system, finding expression in every subject taught, and in the work of every teacher. The first use of vocational guidance in the schools was necessarily largely that of placement, but educators have begun to say that "vocational guidance is not a scheme for finding jobs or of forcing vocational decisions on children;" that "vocational guidance is not to hurry children into vocations, but to delay them and train and educate them for their vocations;" that "vocational guidance is a means of teaching children how to distinguish between a job and a vocation;" and that "vocational guidance is organized common sense

to help each individual make the most of his abilities and opportunities."

Placement will continue, but not as the chief purpose of vocational guidance. It will mean temporary relief while education proceeds through part-time work and study. Vocational guidance will be universally recognized as an educational process, and it will be the business of all teachers, not of a few experts, to direct the child to such education as will best prepare him for the vocation of his choice.

The great leakage now found in the eighth and ninth years of school, due to the fact that pupils and parents see no economic value in the high school course and that the former are eager for active participation in the work of the world, will diminish in proportion to the use made by the teacher of the awakening vocational interest in the pupil, and the extent to which school authorities modify the curriculum, that it may influence conduct rather than simply present systematized knowledge.




INDUSTRIAL TRAINING FOR THE WORKER

*Not* industrial training for the work; the boy is given a chance to "find his place."

A new emphasis will be put on the guidance and training of girls for wage-earning pursuits. This is one of the great problems confronting society to-day; no one can tell in what vocations woman may be found within the next few years. The double function of home maker, which comes to ninety-five per cent of the sex, and of wage earner, which comes to thirty-six per cent, calls for the greatest care in guidance for both pursuits. In most cases the occupational life is first experienced, and if habits of shiftlessness and instability are formed, because of the failure of the girl to adjust herself to the wage-earning field, it will surely prove disastrous to the home. A woman in a wage-earning pursuit to which she is adapted and where she puts forth her best efforts will develop a type of character that is fundamental in the management of a household.

Educating boys and girls that they may rightly choose their vocations in life will become the controlling principle of the school curriculum, and all subjects will be selected and subject matter treated from that viewpoint. Motives and interests will thus be supplied, giving a needed impulse to study by arousing ambition, self-pride and a desire to achieve.

Vocations thus chosen will call forth the best efforts of the individual and produce self-supporting, happy citizens, whose success is measured not only by the extent to which their products are the full measure of their best efforts, but also to the extent that these products are serviceable to society.

Vocational guidance thus interpreted will need the active coöperation of all agencies working in the interests of society, and in turn will serve to strengthen such coöperation. Parents, teachers, employers, private enterprise, social workers and organizations all contribute toward the education of the young people. By the intelligent coöperation of these agencies, the entire training of the child, both within and without the school, may be so utilized in vocational guidance that his intelligent choice of a life career will be well assured. A.S.B.

Consult Bloomfield's *The Vocational Guidance of Youth;* also his "The School and the Start in Life" and "Vocational Guidance," in *Bulletin No. 14,* United States Bureau of Education.

**Related Subjects.** In connection with this discussion of vocational guidance, the reader may find the following articles of interest:

Business College
Education, subtitle *Modern Tendencies in Education*
Household Arts in Education
Industrial Art
Industrial School
Intelligence, Measurement of
Manual Training
Parent-Teacher Association
School, subheads *Continuation Schools*, *Vocational Schools*, *Technical Schools*, *Trade Schools*, *Correspondence Schools*
Technical and Industrial Education

**VOD'KA,** an intoxicating liquor of concentrated form distilled from rye, potatoes, and sometimes from barley, and widely used by the peasants of the northern European plain. The name is associated particularly with Russia. The War of the Nations brought before the government the necessity of improving the conditions of the Russian peasantry, in order to build up a more efficient army and a sound nation. Accordingly, the sale of vodka was abolished by an imperial edict of the czar in 1915. A state monopoly had been established in 1895 in an effort to regulate the sale, purity and price of the liquor and to prevent abuses previously existing in the public houses, or *kabaks.* However, the amount of vodka consumed did not decrease, and the prevalent drunkenness was deplorable. It is estimated that more than 2,000,000 people drank away all their property every year. The edict of prohibition was followed by a transformation in the peasant life and a condition of comparative prosperity in spite of the war and poor harvest.

*Vodka* means *little water;* in its intoxicating and demoralizing properties it belies its name.

**VOICE,** *vois,* that possession of human beings by which they express their thoughts aloud. With the voice mankind produces all the various sounds that range from an angry shout to the soft lullaby of the mother to her child. The voice mechanism might well be compared to an organ, with lungs for bellows; tongue and lips for stops; throat, mouth and nasal cavities for sounding boards, and the vocal cords for reeds. These vocal cords, which comprise the essential feature in voice production, are two small bands of elastic tissue in the larynx, or voice box, one on each side of the windpipe. By an ingenious arrangement of muscles they can be stretched out or be made to relax. When one is breathing ordinarily they are relaxed and have between them a V-shaped opening; but when air from the lungs is driven into the larynx for sound production, the cords stretch and are thrown into vibration, and the opening is narrowed. The more tightly they are stretched the higher are the resulting tones. A deep, rumbling sound is made by relaxed cords. It is continued stretching of these cords that tires the voice.

The ordinary speaking voice differs from the singing voice chiefly in that the latter makes use of a larger number of notes. Modulations of the speaking voice are produced mostly by mouth movements, and the notes produced in quiet talking are nearly all of the same pitch. In singing, the vocal cords are under much greater tension. Pitch is determined by the size of the larynx. Women's voices are higher pitched than men's because the cords are shorter.

**How to Cultivate the Voice.** The fundamental principle in voice development, whether for speaking or for singing, is proper breathing. The method generally taught to-day is based on the use of the abdominal muscles and the diaphragm, the great curved muscle on which the lungs rest (see DIAPHRAGM and accompanying illustration).

When the abdominal muscles force the abdominal organs up against the diaphragm, the latter exerts an even pressure over the base of the lungs, thus gradually forcing the air upwards through the voice box and producing a sound which can be controlled. This control is the principal feature in the production of either the speaking or singing voice; many veteran singing masters keep their pupils for a whole year on lessons to acquire proper breathing control. Later, the pupil is taught properly to pronounce spoken sounds, which means the control of the speaking voice, and finally to produce musical sounds, which is the development of the singing voice.

Only the favored few can hope to cultivate a great singing voice, but almost all can learn to sing the simple songs that add so much to the enjoyment of life. Furthermore, a clear and pleasing speaking voice is within the reach of the majority of people. This kind of voice, however, presupposes a healthy pair of lungs, throat and nose free from inflammation, sound teeth, and good habits in regard to ventilation and eating. One must build up the health to get the most out of this priceless human possession. C.B.B.

Consult Jennings' *The Voice and Its Natural Development.*

**VOICE,** in grammar, a property of transitive verbs, or verbs that require an object to complete their meaning. In the sentences, *Birds build nests in trees* and *Nests are built in trees by birds,* there is one thought expressed, but it is expressed in two different ways. In the first sentence, the verb *(build)* asserts an action of the subject *(birds),* and this action is received by the object *(nests);* in the second the subject *(nests)* is represented as being acted upon, and the verb form has changed.

These sentences illustrate respectively the *active* and the *passive* voice; the active voice is that form of a verb which represents the subject as acting, and the passive is that form which represents the subject as being acted upon. The passive voice of a verb is formed by adding the past participle of that verb to various forms of the verb *to be.* Thus, the passive forms of the verb *build* are *is built, was built, will be built,* etc.

Some authorities consider voice a property of intransitive verbs which express action, in the sense that such verbs represent the subject as acting and so are in the active voice. See the article VERB.

**VO'LAPÜK,** the name given by Johann Martin Schleyer to a language which he invented and which he first made public in 1879. It was intended to be a universal speech, as its name, derived from the English words *world* and *speak,* declares, and words or roots were chosen from most of the languages of Europe. The English predominated, however, but the borrowed words were so altered that they look no more familiar to an Englishman than to a German or a Frenchman. In its structure Volapük is much more closely allied to German than to any other language.

Volapük was the first artificial language to gain any considerable popularity. One nation after another took it up, societies were established all over the civilized world, and within ten years after its publication it had over a million students. That the use of it did not spread more widely is due to dissension among its adherents. Dissatisfaction arose, and reforms were suggested, to which the inventor refused to give his consent, and gradually the reformers broke away and set about the invention of totally new languages. See ESPERANTO.

Consult Hain's *Grammar of Volapük.*

**VOLCANO,** *vol ka'no,* a mountain from whose summit or sides, or both, steam and molten rock are thrown out in large quantities. The name comes from the Latin word *Vulcan,* the name of the Roman god of the

CROSS SECTION OF A VOLCANO

(*a*) Crater; (*b*) extinct crater; (*c*) fissure through which molten lava is penetrating; (*d*) molten lava flow; (*e*) subterranean steam cavity.

fiery elements. All volcanoes of the present day are mountains, and for this reason we always think of a volcano as a mountain, but the mountain need not be present. Any vent or channel in the rock envelope of the earth through which large quantities of steam and molten rock escape is a volcano. The facts are that many of the volcanic mountains have been formed by the material thrown out through such vents. As the molten material reached the surface it became solid and formed a cone around the vent. The cone grew higher and higher as the matter continued to flow, and in time a mountain, with the vent or chimney extending to the summit, was formed. The shape of the cone depended upon the nature of the material thrown out. If it was molten rock the cone was broad and dome-shaped like those of the volcanoes in Hawaii; but if the material was solid matter, the cone was high, with steep, even slopes, like those of the volcanoes in Mexico, South America and the Rocky and Sierra Nevada mountains in North America. The parts of a volcano are the base, which comprises the walls of the mountain, the cone, and the crater, which is the opening of the vent.

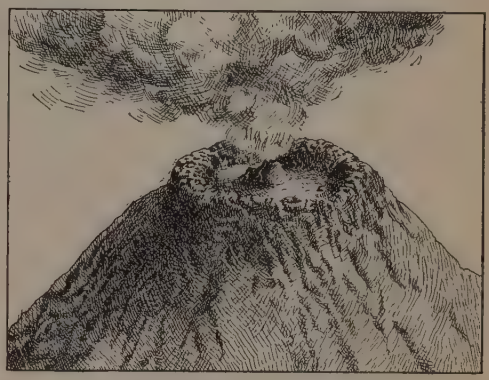
**Causes of Eruption.** "Of all the natural catastrophes," says an eminent geographer, "the explosive eruption of a great volcano is the most terrible." We cannot imagine a force which will rend asunder a great mountain, hurl pieces weighing tons thousands of feet in the air, and scatter the fragments over hundreds of square miles of territory and destroy thousands of lives. Yet disasters of this kind accompany almost every great volcanic eruption. In view of these facts, we do not wonder that scientists have studied for centuries to discover the causes of volcanic eruptions. While they are not able to give reasons that are entirely conclusive in all cases, they are generally agreed upon the following chief causes of volcanic eruptions:

(1) *Pressure.* The rocks are constantly changing, and these movements cause great pressure over certain areas. Geologists claim that this pressure and the friction caused by the movement of the rocks upon each other are sufficient to create a temperature that will melt any kind of rock. In this way pools of molten rock are formed beneath the surface. The molten matter is forced into the adjoining crevices and occasionally finds its way to the surface and flows out as lava.

(2) *Steam.* Steam is by far the most powerful cause of volcanic eruptions. We now and then read of the destruction caused by the explosion of a steam boiler. But if we multiply the force exerted by the boiler by a million we will not have a force as great as that operating in the explosion of a great volcano. We know that the pressure of steam increases with the temperature. Water coming in contact with molten rock is instantly changed to steam having a higher temperature than it is possible to reach in a steam boiler. As the steam continues to form, the pressure increases until it is sufficient to burst the walls of rock by which it is confined, and the explosion occurs with a force that grinds most of the rock to powder, which forms the so-called volcanic ash that often falls over wide areas. Oxygen, hydrogen and carbon dioxide, all of which are found in considerable quantities, probably aid in the explosion.

A few volcanoes are in a constant state of eruption. The most noted examples of these are Mauna Loa in Hawaii, and Stromboli, often called "the sailors' lighthouse," in the Mediterranean. Mount Etna and Mount Vesuvius are types of volcanoes whose periods of eruption are followed by periods of quiet. Usually the longer the period between two successive eruptions, the more violent the delayed eruption. Mount Pelée, on the island of Martinique, whose eruption in 1902 destroyed the city of Saint-Pierre and caused the loss of nearly 30,000 lives, had been quiet for more than fifty years and free from any violent eruption for more than 150 years. An eruption is usually preceded by an increase in the temperature of the earth, the drying up of springs and wells, earth tremors and occasionally severe earthquake shocks, but the inhabitants of the affected region seldom heed these warnings.

**Products of Eruption.** Misunderstanding of volcanoes has led to the use of wrong descriptions of them. A volcano is not a "burning mountain;" what appears to be fire is the reflection of the heated mass in the crater. Neither is the cloudlike mass caused by the eruption of smoke. It is formed by condensed steam and minute particles of rock, falsely termed *ash.* This ash often falls over large areas and to depths varying from a mere covering to many feet. The city of Pompeii was buried by a fall of these ashes in A. D. 79. As the steam is condensed in the cool upper air, showers accompany the eruption. Since the rain brings down more or less of the ash, these are frequently showers of mud; indeed, sometimes large quantities of hot mud and boiling water are thrown out. It was an avalanche of hot mud that destroyed the inhabitants of Saint-Pierre. Many eruptions are accompanied by a flow of molten rock which destroys everything before it.



THE CRATER OF VESUVIUS

**Classes of Volcanoes.** Volcanoes which are frequently in a state of eruption are known as *active;* those that are in eruption at long intervals, as *dormant,* and those which have passed the stage of eruption, as *extinct.* There are

now about 350 active volcanoes in the world and many times that number that are classed as extinct. This classification, however, cannot be considered as fixed. Dormant and even extinct volcanoes may become active, and those that are active may become extinct. Lassen Peak, near Mount Shasta in California, for instance, had been dormant for more than sixty years when in May, 1914, it began to show signs of activity. From June 8 to July 18 it discharged a column of steam that sometimes extended 10,000 feet above the summit of the mountain, and about a year later this was followed by a river of mud which flowed down the north side of the mountain, causing serious damage to the farms and forests in the vicinity.

**Location of Volcanoes.** The map on page 1906 shows that most volcanoes are on or near the coast, or on islands. The great mountain ranges of North and South America, the Rocky Mountains, the Cascades, the Sierra Nevadas and the Andes contain many noted peaks that are extinct volcanoes. Among these are Mount Mazama, in Oregon, whose crater is the cup that holds the celebrated Crater Lake, more than 2,000 feet deep; Mount Rainier, in Washington; Mount Shasta in California, and numerous others in the United States, Canada and Alaska.

In Mexico is Popocatepetl, 17,500 feet; Orizaba, 18,250 feet, and a number of other peaks of nearly equal altitude; a number of the volcanic cones of the Andes are of even greater altitude. Mauna Loa and Kilauea in Hawaii have a world-wide recognition; Japan is noted for Fujiyama, the most perfect volcanic cone in the world, and there are numerous volcanoes, active and extinct, in the islands of the South Pacific. Etna, Stromboli and Vesuvius, all in the Mediterranean Sea, comprise the noted volcanoes of Europe. Those named above, a number in the Aleutian Islands, those of Hawaii and the Philippine Islands include most active volcanoes of the present time. W.F.R.

Consult Bonney's *Volcanoes: Their Structure and Significance.*

**Related Subjects.** In connection with this discussion, the reader will find much that is of interest in the following articles:

| | |
|---|---|
| Aconcagua | Lava |
| Ararat | Mauna Loa |
| Cotopaxi | Mountain |
| Earthquake | Pompeii |
| Etna | Popocatepetl |
| Fujiyama | Rainier, Mount |
| Herculaneum | Shasta, Mount |
| Hood, Mount | Vesuvius |
| Kilimanjaro | |

**VOLE,** an English name for several species of small rodents belonging to the rat family, particularly the *water vole* and the *field vole,* which inhabit the temperate zones of both hemispheres. Water voles have small ears and

THE VOLE

short, hairy tails. In swimming they use only the hind legs, and in spite of their water habits do not have webbed feet. Their fur is dark brown or black. Field voles, or *short-tailed field mice,* have stumpy tails and thick bodies, and are about the size of common mice. Their fur is a grayish-tan. They are so numerous at the harvesting season that they become a plague and do great damage to the grain crops. *Bank voles* resemble them, but have larger ears and long tails, and are in color a rusty brown, somewhat resembling the color of mud.

**VOL'GA,** a Russian river, the longest in Europe. With its tributaries it furnishes more than 20,000 miles of navigable waterway to a region in which live 50,000,000 people. The Volga itself is about 2,300 miles long; two of its branches, the Oka and the Kama, are each longer than any other European rivers except the Danube. Rising near Petrograd, the Volga flows southeast and empties into the Caspian Sea, eighty-six feet below sea level. Its delta has over 200 mouths, of which only eight are of considerable size.

**Commerce.** The Volga has on its banks Saratov, a city of over 200,000 people, and six other cities each with a population of over 100,000. It is connected by canal with Petrograd, the Baltic Sea and the Arctic Ocean. Nearly all the shipping goes upstream. Much of the downstream traffic is in lumber, as the three southernmost provinces on its banks are treeless. The delta and the adjacent Caspian waters are one of the world's greatest fishing grounds. See map, following page 2092.

**History.** The Volga is mentioned in the geography of Ptolemy (which see), and Astrakhan, at its mouth, is an ancient town. The river basin was prominent in the history of the great migrations. A powerful Bulgarian empire

once existed at the junction of the Volga and the Kama, and the word *Bulgar* is so like *Volga* that it probably meant a native of the Volga. Nizhni-Novgorod, a city on the Volga, has the oldest annual fair in the world, to which merchants come from thousands of miles.

**VOLT,** the electromotive force that will drive a current of one ampere through a resistance of one ohm. See VOLTMETER; OHM; AMPERE.

**VOLTA,** *vawl'tah,* ALESSANDRO (1745-1827), an Italian scientist, famed for his researches and discoveries in the field of electricity. His name is perpetuated in such terms as *volt,* the unit of electromotive force, *voltaic pile* and *voltaic battery.* Volta was born at Como, Italy. Before he was thirty he had established a reputation as the author of two brilliant treatises describing a new electrical machine. In 1774 he was appointed professor of physics at the gymnasium at Como, and five years later became professor of natural philosophy in the University of Pavia. Among his inventions are the electroscope, the electrical condenser, the voltaic pile and the voltaic (electric) battery. See ELECTRIC BATTERY.

**VOLTAIC, CELL.** See ELECTRIC BATTERY.

**VOLTAIC PILE.** See ELECTRIC BATTERY.

**VOLTAIRE,** JEAN FRANÇOIS MARIE AROUET DE (1694-1778), a French philosopher, historian and author, born in Paris. His father, a stern man, descended from a good, middle-class family; the mother died when the boy was seven years of age. From his father and the rather worldly Abbé de Châteauneuf he received his early education, and at the end of his college days was thrown for a while into the brilliant Court circles of Louis XIV. He was taken to The Hague in the capacity of secretary to the French ambassador to Holland, where he fell into a dangerous love intrigue with Olympe Dunoyer, and was soon sent back to Paris.

**Twice a Bastille Prisoner.** His career as a writer began with the production of *Œdipe,* which was at first made known only among his best friends. On account of written attacks against the regent Orleans, he was twice compelled to leave Paris in disgrace, and for eleven months, during the years 1717-1718, was imprisoned in the Bastille. After his release, the tragedy *Œdipe* was publicly performed, and the favorable reception it received brought the author fame as a dramatist and no little financial profit. In 1724 his great epic poem, *La Henriade,* appeared, in which he made an eloquent plea for religious toleration. Various troubles, culminating in a quarrel with the Chevalier de Rohan, led to a second imprisonment in the Bastille, followed by his removal to England. At this time (1726) he had written also the plays *Artémire, Mariamne* and *L'Indiscret.*

**English Influence.** His stay in England exercised a great influence on his career, and led to an acquaintance with Congreve, Pope,

VOLTAIRE
From the statue by Houdon

Young, Bolingbroke, Chesterfield, the Walpoles and other prominent men. He was deeply affected by the toleration of free thought and by English manners and literature in general, and his return to Paris in 1729 revealed a marked maturing of his powers. Among the works he produced in the next few years are the tragedies *Brutus, Zaïre* and *Sémiramis;* the *History of Charles XII, King of Sweden;* and the revolutionary *Letters Concerning the English Nation.*

**Life in France and Germany.** He lived at the château of Cirey with Madame du Châtelet, a woman of high intellectual attainments, and it was through her encouragement that he worked steadily on plays, on the translation into French of Newton's *Principia,* and on a history of Louis XIV. After serving as historiographer of France and one of the gentle-

men of the king's bedchamber, he decided to withdraw from the public service and devote all his time to the life at Cirey, but the death of Madame du Châtelet in 1749 changed these plans.

The following year he went to Berlin, on the invitation of Frederick II of Prussia, to live permanently at the Court. The king was arbitrary; Voltaire continued his use of free invective and satire, so that the stay came to an unhappy end after two years. He then found himself also in royal disfavor in France, because of his request to leave the Court there to go to Berlin, and so he bought a country house in the republic of Geneva. The great wealth he had acquired enabled him to supply every comfort, one of the most attractive and pleasurable of which was a private theater where his own plays could be performed.

In 1758 he settled on the estate of Ferney, on which he had secured feudal rights, and, as a consequence, the greatest possible freedom. There he remained until his death. He wrote freely, chiefly short pamphlets attacking religious fanaticism and intolerance, and in defense of the sovereignty of reason. During these years he also contributed to the *Encyclopédie.* The romance *Candide* and the tragedies *Tancrède* and *Irène* belong to this period. He visited Paris again in 1778, took sick before *Irène* was produced, and died on May 30.

**His Many-Sided Genius.** Voltaire's vast work falls naturally into well-defined classes. As a dramatist, the writer of fifty or sixty plays, he revealed marked skill and cleverness. In his poetry there are no touches revealing passion or love of nature; instead, one finds artificial rhythm and conventional grace, combined with an extraordinary felicity in use of words and sharp wit. His literary criticism lacks permanent value; the prose romances were used as a tool for political and religious satire. The historical works are clear and acute, lacking, however, in comprehension of philosophy of history; the philosophical writings, the *Dictionnaire philosophique,* containing articles contributed by him to the *Encyclopédie,* belong, strictly speaking, to the department of social philosophy, and in them he attacked freely the political and religious institutions of his day.

His atheism has been greatly exaggerated by the generations since his death; he attacked orthodoxy, rather than Christianity, and a careful study of his writings does not warrant the broad application of atheist to his name. His fight for liberty led to sharp attacks on abuses, many of which were corrected during his lifetime.

Consult Tallentyre's *Friends of Voltaire;* Morley's *Voltaire.*

**VOLTMETER,** *vohlt'me ter,* a sort of galvanometer (which see) used to measure the pressure of an electric current. It consists of a steel horseshoe magnet which has a piece of soft iron attached to each pole. A cylinder of soft iron is so suspended between the poles of the magnet that it can rotate. Around this cylinder is a light rectangular frame wound with fine, insulated copper wire. A spiral horizontal spring is attached to each end of this frame, and a needle which moves over a graduated dial is attached to the upper end of the axis. When a current passes through the coil of wire it causes this frame to turn on its axis. The springs furnish the amount of resistance that must be overcome by the current, and the position of the needle on the dial indicates the pressure. A volt is a pressure that will produce a flow of one ampere per second against a resistance of one ohm. See AMPERE; OHM.

**VOLUNTEERS,** *vol un teerz',* citizens offering their services in a military capacity to country or state. The volunteer movement originated in England, the oldest volunteer organization in existence being the Honorable Artillery Company of London, incorporated during the reign of Henry VIII (1491-1547). In the United States the senior volunteer corps is the Honorable Artillery Company of Boston.

At the outbreak of the War of the Nations Great Britain and the United States were the only great powers in the world which had not adopted the principle of universal liability to military service. In the United States, the least military of the first-class nations, each national crisis had been met with a loyal response from the people. In the War of 1812 over 10,000 volunteers, besides militia, were engaged. During the War of Secession the regulars numbered only 46,679, yet more than 2,500,000 men voluntarily enrolled in the Federal armies, and half as many in the Confederate ranks. In the Spanish-American War of 1898 volunteers and regulars fought side by side, nearly 200,000 men having responded to the calls issued by President McKinley.

Nineteen years after the close of the struggle with Spain the people of the United States entered into war with the greatest military power on earth. When, in April, 1917, Congress formally passed the declaration that a state of war existed with Germany, the regular

army had a paper strength of 175,000, and the organized militia, or national guard, of 450,000. Such an army was, of course, hopelessly inadequate. President Wilson, however, issued no general call for volunteers at this crisis, for the War Department officials were convinced that the United States could raise the necessary army quickly and justly only by systematic selection of men of fighting age. At the same time, recruits for the regular army, the navy, the marine corps and special branches of the service were sought, and in November, 1917, the War Office announced that 1,400,000 of the men in the service at that time had voluntarily enlisted.

In England the volunteer movement had received more permanent features than in the United States. Previous to the South-African War volunteers had not been looked upon as a valuable military asset, but events of the war caused a complete change of opinion. Volunteer regiments were reorganized and received equipment similar to that issued to the regular and militia battalions of the district to which they belonged. The result proved so successful that the volunteer force enrolled for territorial defense apart from militia numbered over 251,000 men in 1914.

The outbreak of the great war found the nation unprepared from a military standpoint, but even at this supreme crisis an attempt was made to face the emergency through a system of volunteer recruiting, because of the bitter hostility of the English laboring classes to conscription. For nearly two years the volunteer system was employed, and in May, 1916, when the Military Conscription Act was passed, it was announced that there had been 5,041,000 voluntary enlistments in Great Britain since the beginning of the war.

In the various parts of Britain's far-flung colonial empire the loyalty of British subjects to the mother country was demonstrated over and over again. From the outbreak of the war to the fall of 1917, when Canada adopted conscription, the Dominion, with a population of about 7,000,000, gave 500,000 of her sons to the allied cause; that is, one for each fourteen inhabitants. Australia, New Zealand, South Africa and India likewise responded generously with volunteers, and South Africa not only sent a force overseas but raised an army to assist in the conquest of the German colonies in Africa. On the fighting front in Europe a soldier of the South Pacific army was called an *Anzac,* a word made up of the initial letters of the words Australian and New Zealand Army Corps. Ireland, which was not included in the British conscription bill, responded generously to the allied cause, and sent thousands of volunteers to the front.

Probably the most serious objection to the volunteer system is that it takes the finest men, who must make sacrifices for the weak, the cowardly and the selfish. In spite of the inspirational value of volunteering, it is generally agreed that the systematic selection of men of military age is the just and democratic plan for a nation at war. See CONSCRIPTION; WAR OF THE NATIONS. B.M.W.

Consult Huidekoper's *The Military Unpreparedness of the United States.*

**VOLUNTEERS OF AMERICA,** a religious body which came into existence as a result of a division in the Salvation Army and at the request of leading American citizens. In 1896 Ballington Booth, head of the Salvation Army in America, became opposed to his father, William Booth, the founder of the older organization, whose methods he felt were not suited to the work in America. With his wife, Maud Ballington Booth, he established the new association, introducing changes which Americanized the movement, but adhering to the main purpose of the organization built up by his father. It is based on a semimilitary plan, with the United States army as its model, and all of its officers bear military titles; but the system of government is democratic. Thus the "soldiers" elect the commander-in-chief, who is also president of the Grand Field Council. Practically every city of considerable size in the United States has a branch of the Volunteers of America.

The Volunteers maintain benevolent institutions of various sorts, where destitute men or women may find lodging and food. Worthiness in the applicants is not insisted upon, for the aim is to gain a hold even on the most unworthy by charity given and kindness shown. Where the applicant is able, he is allowed to work for what is given him. In a single year over 150,000 lodgings and more than 529,000 meals have been given to the needy, while the number for which some return is made is even greater. A prison league is maintained, which has branches in over thirty state penitentiaries, and with what it calls "Hope Halls" the organization attempts to keep in touch with those who leave the prisons and seek again the confidence of society. There is also a fresh-air branch, which provides outings for women and

children, thus brightening if not saving thousands of lives.

One of the newest features of the society is its Volunteer Hospital in New York City, where 31,910 cases, either medical or surgical, were treated within the first year. Records show an attendance in 1915 of almost 3,000,000 at its indoor and outdoor services, which are conducted in the same manner as those of the Salvation Army, in barracks and in the public streets. The organization publishes *The Volunteers' Gazette,* and distributes large quantities of other Christian literature.

The headquarters of the Volunteers are in New York City. General Ballington Booth and his wife are joint presidents. See SALVATION ARMY. A.MC C.

**VOM'ITING,** the ejection of food and other matter from the stomach through the mouth. The act is brought about by spasmodic muscular contractions of the walls of the stomach. Vomiting is generally preceded by a sensation of nausea, and it is often the result of overloading the stomach or of eating indigestible food. It is an almost never-failing symptom of seasickness. Foods or drugs which poison the system are often ejected through the automatic reaction of the stomach to these harmful substances.

Persons of nervous temperament, who are sensitive to disagreeable suggestions, sometimes vomit merely on hearing the details of a repulsive act, while the effect of seeing disgusting sights and of smelling sickening odors is familiar to every one. In these cases the stomach muscles contract through reflex action. In *retching,* the great muscle lying between the stomach and lungs—the diaphragm—spasmodically contracts, but the contractions bring only discomfort to the patient and afford no relief. In both vomiting and retching the lower end of the stomach remains tightly closed. When an attack of vomiting comes on as a result of imprudence in eating, the sufferer generally recovers quickly after the stomach has been emptied. If a person in normal health begins suddenly to vomit, and the attack is violent and prolonged, he should consult a physician. Such attacks are usually symptoms of poisoning. C.B.B.

**VORTICELLA,** *vawr ti sel' a,* a genus of infusoria, the highest division of one-celled animals (see INFUSORIA). Members of the vorticella genus are minute aquatic animals having a bell-shaped body which is borne on a slender stalk. This stem is attached to a rock, leaf or weed in the water; in some species it is stiff and in others flexible and capable of being contracted suddenly into a spiral. At the free end of the body there is a fringe of hairlike processes called *cilia;* these are constantly in rapid motion, drawing food into the body.

**VOSGES,** *vohzh,* **MOUNTAINS,** a central European mountain range which extends north-northeast along the western side of the Rhine Valley for about 100 miles. The southern portion marks the frontier between France and Germany, and in the north the mountains extend into Alsace. The Vosges are a continuation of the Jura Mountains. They have round, grassy summits, used for pasturage, and their eastern and southern slopes are covered with vineyards. They are composed chiefly of granite and red sandstone, and contain copper, lead, silver, coal and rock salt.

**VOSS,** *fohs,* JOHANN HEINRICH (1751-1826), a German poet and translator, born at Sommersdorf in Mecklenburg. Some of his youthful poems in a Göttingen magazine led to an invitation to that city by the owner of the periodical, and there in the University of Göttingen he obtained a thorough training in Latin and Greek. In 1778 he was made rector, or principal, of the high school at Otterndorf, and during the next four years wrote several scholarly books on language and literature. His fame was assured in 1781, when he finished his translation of the *Odyssey* of Homer, frequently called "the most perfect rendering of Homer into a modern tongue." This translation is so true, vivid and natural that it has made Homer's poem much more a national literary possession in Germany than in any other country. In 1805 Voss went as a professor of literature to the University of Heidelberg, Germany, and he spent the remainder of his life in that institution.

**VOTE AND VOTING.** See AUSTRALIAN BALLOT; BALLOT; ELECTION; WOMAN SUFFRAGE.

**VOTING MACHINE,** *vo' ting ma sheen',* a mechanical device for recording and counting votes cast in elections. There are several varieties of these machines, but the fundamental principle of all is the same. The names of the candidates are arranged in party columns (or in alphabetical order for elections at which party columns are not used) and votes are cast for them by pushing a button or counter, or by turning a lever opposite the name. A "straight" ticket may be voted by pushing a button or lever at the head of the column. Connected with these counters or levers is a complicated

form of calculating machine which records the vote for each candidate, as well as for straight tickets. Some voting machines have as many as 480 separate counters.

One of the best of these devices is about four feet square and supported on a rod frame which puts the top of the machine a little over six feet from the floor. The voter, as he stands in front of the machine, pulls a lever pivoted near the top at the middle. This lever unlocks the machine for voting and at the same time draws behind the voter a curtain hung from a rail at the top of the machine. The name of the candidates are arranged vertically by parties and horizontally by offices. A separate key, shaped like a pointer, pivots over the name of each candidate; to vote it is merely necessary to turn the key from its horizontal position so that it points directly downward to the candidate's name. At the left of each party column is a party lever, by which all the keys in the party column may be set for voting. The operation of this party lever rings a bell, which shows that the vote is ready to be registered. The lever which locks and unlocks the machine must then be reversed, and this movement counts the vote, resets the machine for the next man and draws back the curtain behind the voter.

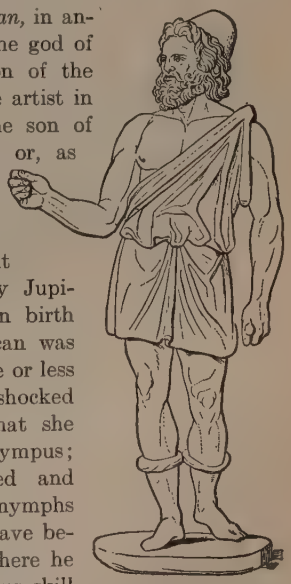
Any of the pointers on the machine can be reversed and other pointers set before the lever is operated to count the vote. Various devices are added, so the voter cannot vote for more candidates than are to be elected. Ingenious devices are in use on different machines to prevent a voter from voting more than once while he is behind the curtain, the aid of an election official usually being required to set the machine after a vote has been cast.

The voting machine in its simplest form was first used in England as early as 1870, by which a ball fell into one of several compartments. This device, however, was used only when one office was to be filled. The more elaborate American machines were first used in an election at Lockport, New York, in 1892. Since then many of the states have passed laws permitting their use at the option of the municipality or other unit of local government. The advantages claimed for the machine as against the paper ballot are many, but possibly not all are justified. It does not, for example, absolutely prevent fraud, for it has been demonstrated that a dishonest election official can so manipulate the mechanism that a vote apparently cast for one candidate is really recorded for another. The machine is so constructed that a voter cannot cast several ballots at one time, as is occasionally done when paper ballots are dropped into the box. The operating mechanism, especially for cities with many candidates and many unintelligent people, presents difficulties, and in many instances where voters have their choice of methods, they have tried the machine and later abandoned it.

A single machine, of a complex variety, may cost as much as $10,000 to $20,000, although the average cost does not exceed $3,000. W.F.Z.

**VOW'EL,** an open, resonant sound made by the voice in speaking. It is the openness of vowels that distinguishes them from consonants, which are formed with the organs of speech more or less closed. A vowel may itself constitute a syllable, or it may be joined with one or more consonants to produce one, but a consonant cannot be pronounced by itself. In English the vowel sounds are represented by the letters *a, e, i, o, u,* and sometimes *w* and *y,* but each letter is made to do duty for several sounds. Thus *a* is pronounced as in *hare, ham, father, flask, hall, what, any, preface, final* and *abound.* The most open vowel sound is *a* as in *father;* the least open, *i* in *machine.* Most other languages have vowel sounds which the English does not possess.

**VULCAN,** *vul'kan,* in ancient mythology, the god of fire and the patron of the blacksmith and the artist in metal. He was the son of Jupiter and Juno, or, as one fable says, of Juno alone, who produced him that she might not be eclipsed by Jupiter, who had given birth to Minerva. Vulcan was born lame and more or less deformed, and so shocked was his mother that she threw him from Olympus; but he was saved and brought up by the nymphs and Nereids, in a cave beneath the ocean, where he gained his marvelous skill in the fashioning of objects from metal.



VULCAN
From a statue in the Vatican, Rome.

It is said that in one of the quarrels between Jupiter and Juno, the latter was suspended between heaven and earth with anvils hanging

to her person. Vulcan saw her there and attempted to rescue her, but was detected in the attempt. This so incensed Jupiter that he kicked the young god out of heaven and in the terrible fall which ensued, Vulcan was still further crushed and maimed. He never returned to Olympus to live, though often he was called to build great palaces for the other gods and always he forged the thunderbolts of Jupiter. He was exceedingly skilful in the use of metals, and many of the objects that he made he was able to endow with life. He made brass-throated, fire-breathing bulls, gold and silver dogs that guarded the houses of his friends, and for himself he fashioned golden maidens, endowed with reason and speech, who waited upon him at his home. His wife, according to some accounts, was Charis, but it is also said that he was married for a time to Venus, who, however, grew weary of him.

This god is usually represented as a serene old man with muscular form, whose hair hangs in curls on his shoulders.

Consult Fowler's *Roman Festivals;* Gayley's *Classic Myths in English Literature and in Art.*

**VUL'GATE,** a Latin translation of the Bible, completed in A.D. 405 by Saint Jerome. The present official edition was published by order of Pope Clement VIII, in 1592. The Vulgate is the basis of the present English Bible used by Roman Catholics (see DOUAY BIBLE), for by a decree of the Council of Trent the Jerome translation was made the standard Bible of the Church. See BIBLE.

**VUL'TURE,** a large, carrion-eating bird of prey, with naked head and neck, found in warm temperate and torrid regions of America. It has a majestic flight and is commonly seen soaring in graceful circles high in the air; from this point it spies out the bodies of dead animals, which form its food. The *black vulture* is two feet in length and measures four and one-half feet across the wings. This bird is of a glossy black color, with a dusky head and neck. It is fairly abundant in the far Southern states, especially near the coast, where it frequents the streets of cities, feeding on refuse. It nests on the ground under logs, bushes, palmettos, etc. The eggs are one to three in number, of a pale bluish-white color, marked with chocolate.

THE VULTURE

The *turkey buzzard* is probably the most widely distributed species of vulture (see TURKEY BUZZARD). The *California vulture,* the largest of the species, has an orange-colored head and neck. The *king vulture* of tropical regions, strikingly marked with black, white, yellow and scarlet, is a bird of the forests and deep swamps. European vultures, while similar to the American in habits, belong to a different group of birds.

THE WORLD BOOK
ORGANIZED KNOWLEDGE IN STORY AND PICTURE
TRADE MARK REGISTERED

# W w

W is the twenty-third letter of the English alphabet. The Phoenician alphabet had no such character, nor had the Greek or the early Latin, in which the sound represented by *W* was indicated by a *u* or *v*. When *u* became established as a vowel and *v* acquired its present force, a new character was formed by the joining of two *u's* or two *v's*. The Italian alphabet has no *w*, nor has the French.

*W* is one of the semivowels, though it never, like *y*, is used without another vowel. It enters into diphthongs, however, as in *now, maw, new,* and is sometimes used after other vowels without changing their sound, as in *borrow.* As a consonant it has but one sound, but is frequently silent before *r,* as in *wreath,* or after *s,* as in *sword.* The combination of *w* with *h* is very common, as in *white,* but is pronounced rather as if the order were reversed and the word were spelled *hwite.* Occasionally the *w* is silent before *h,* as in *wholly.*

**WABASH,** *waw'bash,* IND., the county seat of Wabash County, is situated on the Wabash River, forty-two miles southwest of Fort Wayne, ninety miles northeast of Indianapolis and 130 miles southeast of Chicago. It is built upon rocky, hilly land, and is known locally as the "Rock City." Wabash has extensive shops of the Big Four Railroad, and is served by this road and by the Wabash. Electric interurban lines connect the city with towns in the vicinity. In 1910 the population was 8,687; in 1916 it was 8,730 (Federal estimate). The public buildings include the Federal building, city library, Masonic Temple and Memorial Hall. A rich farming country surrounds the city and brings it an important trade. In addition to railroad shops there are manufactories of cabinets, motor trucks, automobile equipment, furniture and various other commodities. Wabash was settled in 1837 and was incorporated the same year. W.O.L.

**WABASH RIVER,** the chief waterway of Indiana and the largest northern tributary of the Ohio. It rises in the western part of Ohio, flows northwest into Indiana, west to Logansport, then south into the Ohio River. For 120 of its 140 miles it forms the lower boundary between Illinois and Indiana. The Wabash is navigable to Covington, a distance of about 300 miles, and, at high water, as far as Lafayette. Parallel to it, between Terre Haute and Huntington, runs the Wabash and Erie Canal, which connects the river with Lake Erie.

**WACHT AM RHEIN,** *vahKt ahm rine,* DIE ("The Watch on the Rhine"), a patriotic song of Germany, the words of which were written by Max Schneckenburger in 1840, when it was feared that the left bank of the Rhine would fall into the hands of the French. The music was composed by Karl Wilhelm in 1854. The song, however, did not attain widespread popularity until the outbreak of the Franco-German War in 1870. It has almost the standing of a national hymn.

**WACO,** *wa'ko,* TEX., the county seat of McLennan County, is situated in the eastern part of the state, about midway between Austin, the state capital, and Dallas—about ninety-five miles distant from each. It is on the Brazos River, which is here spanned by a fine suspension bridge, and on the Gulf, Colorado & Santa Fe, the Houston & Texas Central, the International & Great Northern, the Missouri, Kansas & Texas, the Saint Louis Southwestern and the San Antonio & Aransas Pass railroads. An interurban line runs to Dallas. The population in 1910 was 26,425; it was 33,385 in 1916 (Federal estimate).

Waco is well provided with educational institutions. Its schools include Baylor University (Baptist), Paul Quinn College (African Methodist Episcopal), the Academy of the Sacred Heart (Roman Catholic) and the Texas Christian University. Other prominent features are a city natatorium, a Federal building, a county courthouse and a Carnegie Library. The medicinal character of the water obtained from numerous artesian wells has made the city a health resort. Cotton growing, general farming and sheep and cattle raising are the industries of the surrounding territory. The city has woolen and cottonseed-oil mills, bottling works, cotton compresses, foundries and machine shops, and manufactories of lumber and iron products, saddles and harness, clothing, tents and awnings and packing-house products. Waco was organized in 1849, and was incorporated the following year.

**WADAI,** *wah'di,* a territory of North-Central Africa, annexed to the French Congo in 1909. The total area is about 170,000 square miles, and the population is estimated at 2,000,000. It lies between Lake Chad, Kamerun and Nigeria on the west and Anglo-Egyptian Sudan on the east. The inhabitants are chiefly Arabs and half-castes, dominated by a race of Mabas, noted for pride, cruelty, drunkenness and love of barbaric display. The prevailing religion is Mohammedanism.

The surface is principally desert, but there are many fertile oases (see Oasis) and some large forests. The country suffers greatly from drought, and in the dry season drinking water can only be obtained from wells dug to a depth of 200 to 300 feet. Large herds of elephants roam the forests, and ostriches abound on the northern plain; quantities of ivory and ostrich feathers are exported. The natives raise horses, cattle, sheep and goats. The chief products of the arable land are maize, millet, cotton and indigo. The capital is Abeshr, whence desert caravan routes cross the Sahara to Bengazi and Khartum.

**WAGER,** *wa'jer,* from a Latin word *vadium,* meaning *pledge,* is a term applied to money staked on the uncertain outcome of some question or event. This money goes to the person who most nearly foretells the result. In many countries, including the United States, contracts and agreements of the sort are not legal, and money lost or won by such terms cannot be secured by law; this makes a wager a *debt of honor,* its fulfillment depending entirely on the honesty of the persons involved. A wager is a *bet;* wagering on the outcome of baseball games, elections and other events of national interest seems to increase in popularity.

**WAGES,** *wa'jez,* in the study of economics, is the share of labor in the distribution of the products of industry. Modern production involves land, capital and labor; the payment for the first is *rent;* for the second, *interest;* for the third, *wages.* In everyday language *wages* usually means the money which one man receives for working for another. Economics, however, considers that all men are working together to make things for each other. If certain men make furniture, their wages consist, not merely in the money which they are paid, but in what they can buy with that money of the food, clothing and other necessities and comforts which other men produce. A man does not have to be employed by another to earn wages; if he works in a business of his own, part of the return it brings him is wages.

**Importance of Subject.** The study of wages is important to the world because it will help to remedy whatever injustice may exist in the distribution of the world's wealth. If those who attempt to better the position of the poorly-paid classes do so without a knowledge of the economics of wages, their efforts may result in confusion.

**What Regulates Wages.** The value of any article—and in economics labor is considered an article—depends upon how much it is wanted in comparison with other articles. The value of labor depends on its supply as compared with the supply of land and capital. In a war men and capital are destroyed; after the war land is less valuable because there are fewer men to want it and they have less capital with which to exploit it; labor, on the other hand, is more valuable because there are fewer men to do the work of the nation, and capital is more valuable because there is less of it to use. To illustrate further, it may be supposed that a farmer has money to use in increasing the output of his farm; he can buy more land or more machinery (which is capital), or he can hire more men. If the supply of labor is plentiful, he will probably hire more men, but if labor is scarce, he will invest in land or machinery.

Under natural conditions a man's wages will in the long run equal the product which he adds to the world by his presence. This does not mean that he will get all that he produces. If the number of men in the world is doubled, the product of labor will not be doubled unless land and capital are also increased, so the

wages of half the men in the world is not half the world's product. To make this clear, it may be presumed that a farmer by doing all the work on his farm can get a crop of 500 bushels. If he hires a helper and gets a crop of 900 bushels, he will not give the helper half, but at the most 400 bushels. If he hires a second helper he may increase his crop another 300 bushels. The most he can pay the second helper is 300 bushels; if the latter is willing to accept this the first helper will have to accept it, too, or the farmer would make more money by hiring the second one alone. The amount which the last man hired adds to the product is called his *marginal product.*

If laborers will work for less than their marginal product, employers will compete for their services, and wages will rise. If, on the other hand, laborers demand more than they add to the product, they will not be hired. Therefore, under ordinary conditions, the wages of a man tend to equal that which he adds to society by his work.

The reason that a railroad president may receive $25,000 a year while the men who lay his track get only $500 is that though there are thousands of men who can lay track, there are very few who can administer a railroad. Therefore, the *marginal product* of the more capable man is greater, because he adds more to the world by his presence.

**Unions.** Because individual laborers are at a disadvantage in bargaining, they have organized labor unions; these endeavor to obtain for their members higher money wages and better conditions of work. In the case above mentioned, if the two farm employees were members of a union they would try to force the farmer to pay them all that they added to his crop, that is 700 bushels, or 350 each, instead of 300. But he would refuse to hire them at this price because he would gain nothing, and if they forced him every season to pay more than the equivalent of his increase he might sell his farm and invest his money elsewhere. Thus, in spite of the union, wages would still tend to equal the product which the last laborer adds. See LABOR ORGANIZATIONS; COLLECTIVE BARGAINING.

The subject of economics goes very much deeper into the study of wages. Among other things it analyzes the causes which keep men in poorly-paid occupations and endeavors to find a remedy for the poverty of millions of wage earners. The study of wages is one of the most vital phases of economics.

Consult Moore's *Laws of Wages;* Gantt's *Work, Wages and Profits;* Emerson's *Efficiency as a Basis for Operation and Wages.*

**Related Subjects.** In connection with this article on wages the reader may consult the following articles in these volumes:

| | |
|---|---|
| Capital | Minimum Wage |
| Economics | Rent |
| Interest | Wealth |
| Labor Organizations | |

**WAGNER,** *vahg'ner,* WILHELM RICHARD (1813-1883), a German composer, poet and essayist, born at Leipzig. As a small boy he was very studious; when only twelve years old he translated the first twelve books of Homer's *Odyssey* merely for the enjoyment of the task. When he was fifteen years of age he was sent to school at Leipzig, but there the teachers did not seem to understand his nature and considered him self-willed. The real cause of this was that Wagner was exceedingly original and his thoughts were not those of an average boy. His first music teacher had the same trouble with him, for the lad refused to believe that certain things should not or could not be done in music and insisted upon breaking the old-fashioned rules in composing. This trait in Wagner's nature caused him to lead an unsettled life for some years, for he did not relish having his definite opinions and convictions disturbed.

RICHARD WAGNER

**At Twenty a Conductor.** In 1833 he became conductor of the opera at Magdeburg, Germany, and was able to hold the place until 1836, though his own operas up to that time had been failures. The audiences were accustomed to hearing music modeled on Italian melodies, which were very fantastic and spectacular, with ridiculous plots, but Wagner refused to compose flashy melodies and meaningless librettos. He chose the old, tragic legends of Germany, constructed deep, serious stories from them, and then set these plots, or librettos, to music; this was sometimes beautiful, sometimes crashing, but always suitable to the meaning of the words.

**First Great Producing Period.** In 1842 he produced at Dresden the opera *Rienzi,* based

on the novel of the same name by Bulwer-Lytton, and the people accepted it. Many in the audience complained, however, that parts of it were not pretty; Wagner answered that the music fitted the story, which in itself was not always "pretty." In 1843 he became chief director of music in the Dresden Theater and immediately began to write his great *Tannhäuser,* based on the old German legend of the knight who was ruined by the temptations of sinful love. He had previously written an opera, *The Flying Dutchman,* founded on another ancient story of a Dutch sea captain whose ship hurried forever from sea to sea; this work, totally unlike the Italian operas, had been warmly received at Dresden. But *Tannhäuser,* just as independent and a far greater production, had a very cold reception; the people still expected light librettos and tunes.

Wagner had to flee from Dresden in 1849 because he took part in a political riot, and he lived at Zürich until 1859. In 1850 Liszt produced Wagner's *Lohengrin* at Weimar, Germany, and it was so successful that the exile hastened to begin work on another musical setting of a great legend. He was allowed to return to Germany in 1861, and two years later completed the masterly work entitled *The Ring of the Nibelung.*

**Second Period.** King Ludwig of Bavaria heard some of the music, invited Wagner to that kingdom, gave him a pension of $600 and a house and commissioned him to prepare plans for a great theater at Munich. Soon, however, Wagner was driven away by political intrigue, and lived near Lucerne for six years. Between 1865 and 1867 he wrote *Tristan und Isolde* and *The Meistersingers.* The composer was anxious to see the entire *Ring of the Nibelung* performed; as there was no opera house in Germany large enough for this immense series of four operas, a theater especially for the purpose was begun at Bayreuth in 1872 and completed in 1876. In August of the latter year the first part of *The Ring,* entitled *The Rheingold,* was played, and was soon followed by *Die Walküre* (meaning *battle maidens*), *Siegfried* and the *Götterdämmerung* (the latter meaning *the twilight of the gods*). These performances placed Wagner permanently among the greatest composers in the history of music.

Many original ideas appeared in this work at Bayreuth; vast and expensive scenery was used; the orchestra was hidden so that any efforts of the musicians to attract attention to themselves were checked, and various new instruments were added to give the dramatic effects. It was notable, too, that Wagner adopted the melos, or endless melody, so that there were no pauses in the entire opera, the music gliding from one act to another and uniting every scene into a harmonious whole. In 1882 he completed *Parsifal,* founded on the legend of the Holy Grail, an opera often considered his most original and deepest music. Early in the next year his health suddenly broke, and he died at Venice of heart failure, on February 13, 1883. He was buried in the tomb erected by himself near Bayreuth.

**Wagner's Greatness.** It should be remembered that Wagner was a great poet and dramatist as well as composer, for his librettos make masterly literature. He created a new epoch in musical history by showing that the melodies of opera should follow the meaning of the story, whether beautiful, ugly, hideous, gentle or angry. In short, he apparently made music express everything of which it is capable when united with poetical and dramatic literature. R.D.M.

Consult Ashton's *Life of Richard Wagner;* Chamberlain's *The Wagnerian Drama.*

**Related Subjects.** The admirer of Wagner will find the following articles in these volumes bearing on his work:

| | |
|---|---|
| Bayreuth | Nibelungenlied |
| Flying Dutchman | Parsifal |
| Holy Grail | Tannhäuser |
| Lohengrin | |

**WAGON,** *wag'un,* a general term for a variety of four-wheeled vehicles drawn by one or more horses and used to carry loads. The wagon is essentially a business vehicle, ranging in size between the light cart such as the grocer uses to deliver goods to local customers, and the heavy dray, employed in transporting coal, sand and other heavy cargoes. In large cities the horse-drawn wagon is being rapidly supplanted by the motor truck. South Bend, Ind., is the leading city in the United States in the manufacture of wagons and carriages; the factories of that city turn out about 100,000 vehicles a year. The Conestoga, made originally in Conestoga, Pa., is a broad-wheeled wagon designed especially for carrying very heavy loads.

**WAG'TAIL,** a small, insect-eating song bird, found throughout the Old World. It may be recognized by various quick movements, especially that of suddenly standing still and wagging its tail. The *pied wagtail* has plumage of

variegated black and white. The *yellow wagtail* has olive-green upper parts and a breast and abdomen of rich sulphur-yellow. A species of wagtail is found on the coast and islands of Alaska in summer, nesting under or beside stones and in bunches of grass. The nest is woven of roots and grasses, and lined with moss and animal fur. The four to six eggs are white, thickly spotted with brown. Certain birds which are larger than most members of the warbler family are frequently called warblers in the United States and Southern Canada.

**WAITE,** *wayt,* MORRISON REMICK (1816-1888), an American jurist, for fourteen years Chief Justice of the United States Supreme Court. He was born at Lyme, Conn., was graduated at Yale in 1837, and two years later was admitted to the bar in Maumee City, O. In the practice of his profession there and later in Toledo he became one of the best-known lawyers in the state. For one term he served in the Ohio legislature as a Whig, but in 1856 he took part in the founding of the Republican party and enthusiastically supported Abraham Lincoln. In 1871 he was a representative of the United States before the Geneva Tribunal which considered the Alabama claims (see page 131); in 1873 he was president of the Ohio constitutional convention, and in 1874 was appointed by President Grant to succeed Salmon P. Chase as Chief Justice.

The questions which came before the court during his term were many and important. Among those cases on which he wrote the opinions were the interpretation of the "war amendments" in the Constitution, the power of the President to remove from office, the power of the states to prohibit the liquor traffic and polygamy cases. In the office of Chief Justice he was succeeded by Melville Weston Fuller (which see).

**WAKE,** formerly, in the Church of England, an annual parish celebration of the dedication of a church, a feature of which was the reading of prayers on the preceding evening and the singing of hymns through the night. The festival afterward degenerated into a street fair, often lasting several days and marked with drinking and dancing. The Roman Catholic custom of keeping watch over the dead through the night is also known as observing a wake.

**WAKE'FIELD,** MASS., a town of Middlesex County, composed of the villages of Greenwood, Montrose and Wakefield. It is ten miles north of Boston and on the Boston & Maine Railroad. Interurban lines operate from the city in all directions. The chief industrial plants are manufactories of rattan furniture, pianos, knit goods, shoes, stoves and lead-lined iron pipe. Wakefield has a $100,000 town hall, a state armory, a Y. M. C. A. building, the Beebe Library and a good park system. Great numbers of militiamen are attracted to the town annually by the state and New England rifle tournaments held there. The place was settled in 1639. Population in 1910, 11,449; in 1916, 12,733 (Federal estimate).

**WAKE-ROBIN,** a poetic name frequently applied to the trillium (which see).

**WALDECK-ROUSSEAU,** *val dek' roo so',* PIERRE MARIE RENÉ (1846-1904), a French statesman, born at Nantes and educated for the law. In 1879 he was elected to the Chamber of Deputies from Rennes, and two years later became Minister of the Interior in Gambetta's Cabinet. This position he also held in the Cabinet of Ferry from 1883 to 1885. He entered the Senate in 1894 and in the next year was an unsuccessful candidate for the Presidency of the republic.

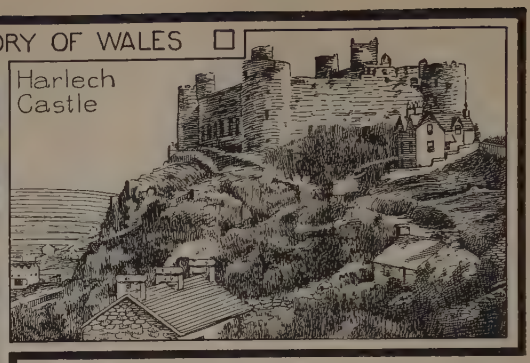
In 1899 he was called upon to form a Cabinet, and at once set himself the definite task of restoring the faith in the republic which the Dreyfus case and other disorders had shaken. The Dreyfus case was again taken up and was finally brought to a conclusion by a proclamation of amnesty to all connected with it. In 1902 he resigned, having accomplished much toward the strengthening of the state and having held office longer than any other Premier.

**WALDENSES,** *wol den'seez,* a Christian sect founded in the Middle Ages, whose members were followers of Peter Waldo. Waldo was a wealthy merchant of Lyons, France. In 1170 he gave his money to the poor and began a life of poverty and devotion; many followers gladly took his vows of poverty, chastity and obedience. The Waldenses believed, further, that men should interpret the Bible in their own way, that religious works should be translated into and preached in dialects and tongues of the common people, and that any layman might preach. They were subjected to persecution, and in 1231 were excommunicated by Pope Gregory IX, but they grew in numbers and the sect persisted until the dawn of religious toleration freed them from interference of Church or state. To-day there are over 12,000 communicants in Italy, and stations are maintained also in Argentine Republic, Uruguay and the United States.

Consult Schaff's *Creeds of Christendom.*

THE STORY OF WALES

Welsh Women


Harlech Castle

**WALES,** *waylz,* a political division of the British Empire which is geographically and administratively a part of Great Britain, but with respect to history and racial character has a place of its own. The name is from an Anglo-Saxon word meaning *foreigners,* and in a sense the Welsh are foreigners to the English, though they are really more British than the English themselves; for it was to the mountains of this far western region that the early Britons retired when the invaders from over the sea pressed too hard upon them.

**Size and Location.** Wales is a broad peninsula jutting out from the western coast of England. Its north and south length is 136 miles; its greatest breadth, in the extreme south, is 96 miles; its area is 7,446 square miles. That is, this country, historically so important, has an area noticeably smaller than that of Massachusetts or New Jersey.

The population of Wales was 1,647,290 in 1911; there is thus an average density of 221 inhabitants to the square mile. The density in Massachusetts is more than twice as great, but Massachusetts has one city with almost half as many inhabitants as has Wales. The largest city of Wales, Cardiff, had 184,663 inhabitants in 1911.

**The Land.** The mountains of Wales are not high. Snowdon, the loftiest point in Wales and in the British Isles, rises to an altitude of only 3,590 feet; but the peaks are rugged and craggy, and much of the hill country has that wild and picturesque character which makes it a fitting background for the weird legends and semi-historic wonder tales in which Wales abounds. More than one traveler does not hesitate to declare that "the lone mountains and the wide moors" constitute the most beautiful country in the world. Especially lovely is the outlook when the heather is in bloom.

Several of the important rivers of Great Britain—the Severn, the Wye and the Dee—rise in Wales or flow through it; and there are in addition numerous rapid, dashing streams which find their way through the mountains. These are of no commercial importance, but the Conway, in the northern part, though only twenty-four miles in length, is broad and navigable. In the mountain regions there are many deep lakes, or "tarns," which add to the beauty of the landscape.

**The People.** A mountainous country, separated by its hilly barriers into districts not readily accessible, is certain to develop in its people certain characteristics, and Wales has been no exception. Its people are sturdy and liberty-loving—"gallant Wales," one writer calls the little country—and, like the ancient Greeks, have never seemed to feel that desire for national unity which would have certainly grown up among them had they lived in closer contact on an open plain. The people are, on the whole, contented and cheerful; they love not only the scenic beauties which are bringing travelers to their land in constantly increasing numbers, but all the lore connected with their ancient churches and castles and their historic spots. Nothing makes an old peasant or villager happier than to be asked by visitors to point out and describe some interesting spot with which he has been familiar from childhood.

Life in the Welsh villages is simple. The women may take part in all the occupations with which the men are busied, and in addition are notable housewives. Their particular virtue is thriftiness, and the men seem to real-

ize this, for they submissively turn over their wages to their wives and take for their own use just whatever is handed out to them. Despite this thriftiness, however, the larder is always well stocked, for the Welsh are hospitable.

LOCATION MAP

Religion plays a great part in the lives of the people, and the numerous chapels throughout the country are centers of interest and activity. Most of the people belong to some evangelical Protestant denomination, the Methodist Church being particularly strong.

**Resources and Industries.** Little Wales produces about one-fifth of the coal output of the entire United Kingdom. Cardiff is the greatest coal-shipping port in the world, sending out annually over 20,000,000 tons. Other minerals exist in considerable quantities; iron, tin, copper and zinc are of especial importance.

Over half of the land of the country is arable, and much of it is very fertile. The cereals constitute the chief crop, but among the agricultural pursuits stock raising is of first importance. Sheep farming has grown rapidly, and the typical Welsh sheep, a small mountain breed, is of value both for its wool and flesh.

**History.** The inhabitants of Wales call themselves not Welsh, but *Cimri,* and this name they have borne since Roman times. The Romans found the early dwellers in this region very hard to conquer, and the Anglo-Saxons, who came centuries later, did not even attempt to rule here. Many of the Celtic inhabitants of Britain, driven by the Teutonic invaders, took shelter in the Welsh mountains, and in turn were merged in the original tribes. A unified government, however, was never established, and the little states were constantly at war with one another, while those on the English border had frequent clashes with their Anglo-Saxon neighbors.

Even after William the Conqueror had forced from Wales a nominal submission, the border regions suffered from frequent raids, and William's success established the "Marches," whose lords were given large privileges in payment for holding back the Welsh. Edward I, by his invasions between 1276 and 1284, finally compelled the Welsh to accept the most humiliating terms, and the introduction of English government was promptly begun. To rouse the pride of the Welsh and to purchase their loyalty, Edward conferred upon his son, born in 1301, the title of Prince of Wales, and that title the heir to the throne has borne ever since.

But so turbulent and independent a people was not likely to remain submissive, especially while the bards, or minstrels, continued to stir up the spirit of revolt. The last rebellion of importance was that headed by Owen Glendower, whose death in 1415 put an end to the rising. Since 1536, when Wales was incorporated with England, and its people were given the privilege of the English, there has been little or no trouble. See ENGLAND; GREAT BRITAIN. A.MC C.

Consult Stone's *Wales: Her Origins, Struggles and Later History, Institutions and Manners.*

**WALES,** PRINCE OF. See PRINCE OF WALES.

**WALHALLA,** *wahl hahl'a,* or **TEMPLE OF FAME,** a splendid gray marble building erected in 1830 at Ratisbon, Bavaria, by Ludwig I, and named after Valhalla, the hall of the Scandinavian gods. It is 115 by 246 feet in size, and in style of architecture resembles a Greek Doric temple. On the exterior are sculptured reliefs of "Germania Set Free by the Battle of Leipzig." The interior hall, of Ionic style, fifty feet wide, 180 feet long and fifty-six feet high, is decorated with a frieze of scenes from early Teutonic history. The hall contains over a hundred busts of noted Germans, and six Victories by Rauch, the celebrated sculptor.

**WALKER,** *wawk'er,* the family name of two Americans, father and son, who gained distinction in the field of economics.

**Amasa Walker** (1799-1875) was born at Woodstock, Conn. He was educated in the public schools of that town and from 1820 to 1840 engaged in various kinds of commercial

work in Connecticut. Because of his keen interest in economic questions he retired from business in 1840 to make a special study of political economy, and from 1842 to 1848 was lecturer on that subject in Oberlin College. He was for some years examiner in the same science at Harvard, and between 1859 and 1869 was a lecturer in Amherst College.

Being a zealous advocate of peace, he was chosen a delegate to the first international peace congress, held in London in 1843, and to the one held in Paris in 1849. He served in various state offices in Massachusetts, among them that of secretary of state. While not highly original in his economic theories, he was intensely practical in their application, and his book, *The Science of Wealth,* has been widely popular for this reason.

**Francis Amasa Walker** (1840-1897), son of Amasa Walker, was born at Boston. He was educated at Amherst College and was studying law when the War of Secession opened. Entering the Union army as a sergeant-major, he gained considerable prominence through his ability in judging the position, strength and probable tactics of the enemy, and showed such bravery that on the request of General Hancock he was promoted to the rank of brigadier-general. In 1868 he was an editorial writer for the Springfield (Mass.) *Republican;* in 1869 became head of the Bureau of Statistics in the United States Treasury, and the next year had charge of the Ninth Census. After serving for a short time as Commissioner of Indian Affairs he was chosen professor of political economy in the Sheffield Scientific School of Yale, and remained in this work from 1873 to 1881. In 1880 he again had charge of the census and the next year became president of the Massachusetts Institute of Technology.

As a student of economics he was an independent thinker, and such books as *The Wages Question; Money; Land and Its Rent* and *International Bimetallism* had a great influence over other economic investigators. In fact, he is still considered a foremost authority on political economy, and is frequently quoted in modern textbooks on the subject. B.M.W.

**WALKER,** Sir [Byron] Edmund (1848- ), a Canadian financier, well known as an author on banking and other financial matters, and after 1907 president of the Canadian Bank of Commerce. Sir Edmund was born in Haldimand County, Ontario. After some experience in the banking office of his uncle, he entered the employ of the Canadian Bank of Commerce in 1868. Continuing in the service of this institution, he rose steadily, becoming general manager in 1886, a director in 1906, and president in 1907. Sir Edmund has been president of the Canadian Bankers' Association and of the Canadian Bank of Commerce, and in 1910 was elected chairman of the board of governors of the University of Toronto. He was knighted in 1910.

Sir Edmund has large financial interests in addition to those directly connected with the Canadian Bank of Commerce, and was a conspicuous supporter of the government during the War of the Nations. Among his writings are *The Canadian System of Banking; Banking in Canada; Why Canada is Against Bimetallism,* and *Canadian Surveys and Museums.*

**WALKER,** William (1824-1860), an American adventurer prominently connected with several filibustering expeditions. In 1853 he attempted the conquest of the Mexican state of Sonora, but his expedition was a failure, and he was obliged to stand trial at San Francisco for violating neutrality laws. In 1855 he made himself President of Nicaragua, but was expelled through an insurrection. A later plot to gain control of Honduras was frustrated, and in 1860 a Honduran court-martial condemned him to be shot. See Filibusters.

Consult Doubleday's *Reminiscences of the Filibuster War in Nicaragua.*

**WALK'ERVILLE,** a town in Essex County, Ontario, adjoining the city of Windsor and directly across the Detroit River from the city of Detroit. Like Windsor, Walkerville is a manufacturing center, its chief products being steel and automobiles. Wire, drugs, paints and varnishes are also important. The town boasts of being the only one in Canada to have no unpaved streets. It owns and operates its electric light and power systems, and has a splendid Dominion building, completed in 1915 at a cost of $90,000. Population in 1911, 3,302; in 1916, estimated, 5,300.

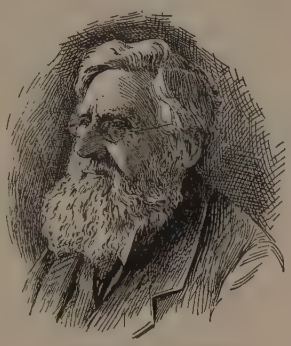
**WALKING STICK,** the name applied to a group of peculiar insects which are remarkable for their close resemblance to twigs. They are related to the locusts, and are most abundant in tropical regions. A common species, found in the Eastern United States, and illustrated on page 6127, has a long, slender body and thin, elongated legs that are literally "walking sticks" in appearance. When first hatched this insect is brown, but it soon turns green, and later in the season resumes its original brown color. These changes are interesting examples of pro-

tective coloration (which see), for the insect tones in with the twig on which it rests and can with difficulty be distinguished from it. This

THE WALKING STICK
It is difficult at all seasons to distinguish the insect from the twig to which it clings.

particular species is a greedy eater of leaves. Walking sticks are related to the leaf insects of East Indies (see LEAF INSECT).

**WALLACE,** *wol'ays,* ALFRED RUSSEL (1823-1913), a British naturalist and philosopher, who, like Charles Darwin, but independently of him, originated a theory of natural selection. He was born at Usk, in Monmouthshire. While serving as a land surveyor in Wales, he became engrossed in the study of botany; also, in 1844-1845, as English master in the Collegiate School at Leicester, he began the collection of beetles and insects in general. In 1848 he explored the Amazon River and five years later published his accounts in *Travels on the Amazon and Rio Negro;* then followed several years of exploration and research in the Malay Archipelago.



ALFRED RUSSEL WALLACE

His investigations of the differences among the tribes he met made him a firm believer in evolution, and it was at this time that he originated and formulated his theory of natural selection, the idea of the "survival of the fittest" coming to him while he was reading Malthus's *Essay on Population.* He wrote his essay *On the Tendency of Varieties to Depart Indefinitely from the Original Type,* sent it to Darwin, who immediately recognized it as an almost unparalleled coincidence that the author of the paper, a stranger to him, should have arrived at exactly the same conclusions as those he had formulated in an article just ready for publication.

A collection of Wallace's essays, written at this time, was published in 1871 under the title *Contributions to the Theory of Natural Selection.* Other important contributions to scientific theory were *Tropical Nature, Geographical Distribution of Animals* and *Island Life;* in these he emphasized the effect on animal life of climatic and geologic changes and further substantiated his own theories of the causes of evolution. Ten years later his *Miracles and Modern Spiritualism* appeared; the views therein expressed have not been generally accepted. During the later years of his life he turned to sociology. He was made president of the Land Nationalization Society, and in *Land Nationalization* urged the need for state ownership of the soil.

Among later works are his *Autobiography, Man's Place in the Universe* and *Social Environment and Moral Progress.* He received the Royal medal in 1868, was president of the Entomological Society of London in 1870-1871, enjoyed a moderate pension from the Government during the last years of his life, and received honorary degrees from both Oxford and Dublin. His surest claim to permanent fame rests on the discovery which made him at the same time the rival and the intimate friend of Darwin. A.MC C.

Consult Marchant's *Alfred Russel Wallace: Letters and Reminiscences.*

**WALLACE,** LEWIS (1827-1905), familiarly known as LEW WALLACE, was an American novelist and soldier, born and educated at Brookville, Ind. He was studying law in Indianapolis at the outbreak of the Mexican War, during which he served as lieutenant. At the close of the struggle he practiced law, first at Covington, Ind., and then at Crawfordsville, but again abandoned his profession to take an active part in the War of Secession. He served first as colonel of the Eleventh Indiana In-

"LEW" WALLACE

fantry, but before the war was over had been promoted to a major-generalship. He was in the engagement at Shiloh and served on various courts, notably that which tried the commandant of the prison at Andersonville and that which tried the conspirators against Lincoln.

In 1865 he resumed law practice at Crawfordsville, five years later was appointed governor of New Mexico, and during Garfield's administration was minister to Turkey. Wallace was popular as a lecturer and attained a wide reputation as the author of three novels—*The Prince of India; The Fair God,* a tale of the conquest of Mexico, and *Ben Hur,* a tale of the time of Christ. This last-named book was very successfully dramatized, its strength lying in its spectacular rather than in its dramatic features. Few books of the century have been more popular than *Ben Hur.*

**WALLACE,** Sir William (about 1272-1305), whose name for 700 years has inspired Scots to deeds of bravery, was the first of the great Scotch patriots.

In 1296 the English king, Edward I, deposed the Scotch king and stationed English soldiers in Scotland. Wallace, a young man of unusual strength and courage, one day quarreled with soldiers who had called him a "wretched Scotsman," killed one, and fled to the Highlands. Gathering a band of bold men, he began to make attacks on the English. At Stirling Bridge, near which now stands his monument, a great stone tower, he routed an army sent against him. Then King Edward came home from France and led a larger force against the Scotch. At Falkirk his armored soldiers defeated Wallace's poorly-clad peasants, and for seven years the "guardian of Scotland" was obliged to hide in the mountains. When captured he was executed as a traitor, though he had never sworn allegiance to England.

In Burns' famous poem *Bannockburn* Robert Bruce begins his stirring address to his soldiers:

"Scots wha hae wi' Wallace bled."

Thousands of boys and girls have found fascination in the story of Wallace's heroic deeds as told in Jane Porter's *Scottish Chiefs.*

Consult Murison's *Sir William Wallace;* Moir's *Sir William Wallace.*

**WALLACEBURG,** *wol'ays burg,* a town in Kent County, Ontario, in the southwestern part of the Ontario peninsula. It is about sixty miles northeast of Detroit, on the Erie and Huron division of the Pere Marquette Railroad, and is eighteen miles northwest of Chatham and thirty-one miles south of Sarnia. Lake boats drawing not more than eighteen feet ascend the River Sydenham as far as Wallaceburg. The Chatham, Wallaceburg & Lake Erie, an electric railroad, also provides transportation facilities. Population in 1911, 3,438; in 1916, estimated, 4,600.

The town is noted as the center of the Ontario beet-sugar industry; the sugar refinery has an annual output valued at $8,000,000. There are also a large glass factory, with 600 to 800 employees, a brass and iron foundry, and other manufacturing establishments. The town has a large supply of natural gas, which is sold to manufacturers at a very low rate. Electric current, for power and lighting, is derived from Niagara Falls.

**WALLA WALLA,** *wol'a wol'a,* Wash., the county seat of Walla Walla County, is situated in the southeastern part of the state, on Mill Creek. It is about 200 miles southwest of Spokane and 245 miles northeast of Portland. A hard-surfaced road extends thirty miles west to Wallula, a port on the Columbia River, which has boat connections to Lewiston, Idaho, and Astoria, Oregon. Railroad transportation is provided by the Northern Pacific and the Oregon-Washington Railroad & Navigation Company. Population in 1910, 19,364; in 1916, 25,136 (Federal estimate).

Walla Walla is the seat of Whitman College, Walla Walla College, Saint Paul's School for Girls, De La Salle Institute and Saint Vincent's Academy. Interesting features of the city are a Federal building, completed in 1913 at a cost of $125,000, a courthouse, built in 1916 at a cost of $200,000, a Carnegie Library, Saint Mary's Hospital and a $220,000 high school building. There are several public playgrounds; the largest, City Park, contains forty acres. Walla Walla is in a county whose annual wheat production is approximately 4,000,000 bushels. Fruit, vegetables, dairy and poultry products and live stock are important products of the city and surrounding territory. In the city there are meat and cold-storage plants and manufactories of harvesting machinery. The town, first called Steptoe City, grew up about a fort established in 1856. The place was chartered as a city in 1868, and in 1911 adopted the commission plan of government. *Walla Walla* is the Indian term for *rushing water.* O.C.S.

**WALLENSTEIN,** *wol'en stine,* Albert Eusebius Wenzel von, Duke of Friedland, Sagan and Mecklenburg (1583-1634), a German gen-

eral and statesman, with the exception of Gustavus Adolphus the greatest figure during the Thirty Years' War. He was born at Hermanic, Bohemia, of noble but not wealthy parentage, and was first sent to be educated at the Moravian Brotherhood of Koschumberg; later he entered the Jesuit college, and afterwards studied at the universities of Padua, Altdorf and Bologna.

Wallenstein rendered gallant service in the Hungarian army, and traveled considerably. In 1606 he returned home, married a widow, who at her death eight years later left him great wealth, and soon became prominent in the affairs of Bohemia. In 1617 he offered the Emperor 200 horsemen for service in the war against Venice, commanding them in person, and was created count of the empire and colonel in the imperial army. At the opening of the Thirty Years' War Wallenstein, though approached by the revolutionary party, cast his fortunes with the imperialists and equipped a regiment of cuirassiers, serving with marked ability.

Having gained possession of his mother's estates through the conquests of the war, Wallenstein bought at a low price a large number of confiscated lordships and formed the territory of Friedland, of which in 1625 he was created duke. When the king of Denmark declared war on Ferdinand, Wallenstein offered 20,000 troops for his monarch's support, if placed in command. The offer was accepted, and Wallenstein joined Tilly in Northern Germany and defeated Mansfeld at Dessau. Peace being established in Hungary, Wallenstein marched in 1627 to Silesia, and again joining forces with Tilly against the Danes, completely routed the enemy. He had previously purchased the duchy of Sagan; in recognition of his services the duchy of Mecklenburg was granted to him, and he was made admiral of the Baltic and generalissimo on land.

Complaints of the successful leader soon began to reach the emperor, but to these he gave little attention. But Wallenstein's many enemies among the princes were busy, and finally these, combined with the intrigues of France, became so urgent that Ferdinand was obliged to dismiss Wallenstein. The latter retired to Prague, where he lived in "mysterious magnificence" till, on the death of Tilly the next year, Ferdinand again turned to his deposed general for aid. At first Wallenstein declined, but finally, being placed in absolute military control, raised in three months an army of 40,000 well-armed and disciplined men, and a second time drove the Saxons from Bohemia. At the battle of Lützen the imperialists were defeated, but the death of Gustavus Adolphus was a distinct advantage to them.

Wallenstein then retired to Bohemia and entered into negotiations with Saxony, Sweden, Brandenburg and France, but what his policies were is not clear. He had great ability as a statesman, and his schemes seem mostly to have been conceived around the fundamental idea of "German unity." Though liberal, he was arrogant and passionate, and any distrust irritated him. He finally retired to Bohemia, with headquarters at Pilsen, quite aware of the activities of his enemies, but with great confidence in the loyalty of his soldiers. Eventually, however, the Emperor was persuaded to issue an edict removing him from military command and charging him with high treason. Retreating to Eger, Wallenstein once more opened communication with the Swedes, seeking an alliance; the emperor knew of this attempt at double dealing, and to protect himself, caused soldiers to assassinate Wallenstein, February 25, 1634.

It is said that few surpassed him in power of quickly organizing great masses of men and inspiring them with confidence. A.MC C.

**Related Subjects.** In connection with this article on Wallenstein, the reader may consult the following topics in these volumes:

| | |
|---|---|
| Ferdinand | Thirty Years' War |
| Gustavus, subhead *Gustavus II* | Tilly, Count of |

**WALLFLOWER,** *wawl'flou er,* sometimes called *gillyflower,* a fragrant, climbing garden and house plant, native to Southern Europe, and so named from its habit of growing on walls, over ruins and along stony cliffs. At one time it was called *heartsease,* and there is a red variety in England which goes by the name *bleeding heart,* but the latter is not like the American plant which is so named. The wallflower is a shrubby herb belonging to the mustard family, bearing clusters of single or double flowers; in the wild species these are a cheerful yellow, but they are variegated in cultivated varieties.

**WALLINGFORD,** *wol'ing fohrd,* CONN., a city, or borough, in Wallingford town, New Haven County, twelve miles northeast of the city of New Haven. It is served by the New York, New Haven & Hartford Railroad, and is on the Quinnipiac River. Population of the borough in 1910, 8,690; in 1916, 9,917 (Federal

estimate). The population of the town in the latter year was 12,508.

Wallingford has a Masonic Temple, a public library, a sanitarium and a government building. It manufactures sterling silver goods, iron and brass beds, plated ware, insulated wire and celluloid novelties. The town was settled in 1670 by about a hundred pioneers from New Haven. Near the borough the Wallingford Community was organized in 1851, the successful Oneida Community (which see) being the stimulus.

**WALLOONS,** *wah loonz',* the name given to the Celtic inhabitants of the provinces of Southern Belgium, descendants of the ancient Belgae. They are more like the French than the Germans, and are remarkable for their thoroughgoing business ability. Many noted statesmen of Belgium are descended from Walloon ancestry. In stature the people are short, and most of them have dark complexions. Until the fifteenth century the Walloon dialect was the literary language of the country, but at that time its place was taken by French. In 1916 there were 3,000,000 Walloons in Belgium. See BELGIUM, subhead *Inhabitants and Languages.*

**WALL PAPER,** or **PAPER HANGINGS,** a term embracing paper, plain or decorated with various designs, which is used for covering walls and ceilings of rooms. The use of paper for these purposes is of Chinese origin, and was not extended to other parts of the world until the eighteenth century. In Europe previous to the introduction of paper hangings, wall decorations consisted chiefly of tapestry and velvet hangings, and the first strips of wall paper were in imitation of these hangings. Other designs and effects were gradually introduced, and a vast industry was created; but in England and other European countries the most costly wall papers in use are still based on imitation of old tapestry effects. In America, the tendency has been to produce entirely new effects, and the adoption of modern machinery has so increased production that while the annual output of wall paper at the end of the eighteenth century only reached the value of $25,000 a year, it is now estimated that the yearly product reaches a total value of nearly $25,000,000.

The first machines for the printing of wall paper could only produce sheets which had to be pasted together before the pattern or design could be applied. The cylindrical roller presses of the present day, however, make it possible to produce it in practically unending rolls, the pattern being applied or printed much in the same way in which a modern newspaper is printed, excepting that the presses are very complicated, for the production of colors and for embossing.

Great advance has recently been made in the designing of wall paper, all large manufacturing concerns employing a staff of designers who strive for original and artistic effects. In hanging the paper, or pasting it on the walls, skill is required to place the paper without wrinkling and to secure the proper matching of the pattern.

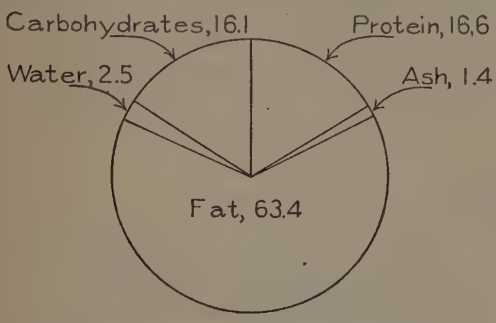
**WALNUT,** *wawl'nut,* a family of nut-bearing trees, comprising about a dozen species, all of which are valued for their wood and for their sweet, edible fruit. Most of the species are native to North America or Asia. In America

THE BLACK WALNUT
Form of the tree, as seen in winter; leaves and nuts, whole and in cross section.

three species are well known; these are the *butternut,* or *white* walnut (see BUTTERNUT, page 1027), the *black* walnut and the *English,* or *Persian,* walnut. The black walnut, a splendid tree that attains a height of 150 feet and a diameter of six feet, is distributed from Southern Ontario to Florida and west to Nebraska and Texas. It is a noble shade and ornamental tree, but is chiefly valued for its hard, durable, fine-grained wood. This wood is of a dark, purplish-brown color with a silvery luster, and is highly esteemed for interior finishing, furniture and gunstocks. Black walnut has become rare with recent years; the old-fashioned walnut bedroom sets, chests and tables prized as heirlooms are now very valuable, as few of

these can be made hereafter. The tree bears a large, round, oily nut, which, however, does not keep well. From the bark of the tree and the outer husks of the nuts is obtained a dark brown dye, much used in darkening light-colored woods.

None of the walnut trees produces better nuts than the Persian, or English, walnut. This species was brought from Persia to Southern Europe, and from there it was taken to England and to America. The tree grows from




COMPOSITION OF THE WALNUT

The walnut contains little waste material. Nearly two-thirds of it contains heat-producing fats, hence it is a good winter food, in small quantities. It is a greater heat producer than almost all meats, averaging 3,180 calories per pound.

sixty to ninety feet in height, and bears large, spreading branches. Its nuts are sweet and nutritious when ripe, and when unripe they make good pickles and ketchup. In California, especially, the English walnut is a valuable commercial tree. Its wood is lighter than that of the black walnut, but is hard and fine-grained, and is used for much the same purposes as the other species.

**WALPOLE,** *wol'pohl,* Horace, Fourth Earl of Orford (1717-1797), an English man of letters, the son of Sir Robert Walpole. After graduating from Eton and Cambridge he spent several years in travel on the Continent, and on his return in 1741 entered Parliament. He retained his seat until 1768, though never pretending to have any real interest in politics. His home at Twickenham, which he christened Strawberry Hill, was famous for the collection of antiques which he had gathered there, and was often visited by tourists. In 1764 he published *The Castle of Otranto,* an exaggerated tale of mystery, which became very popular and was widely imitated. A tragedy on a similar theme, *The Mysterious Mother,* followed in the next year, and was in its turn followed by *Historic Doubts on the Life and Reign of Richard III.*

It is not on any of the above, however, that Walpole's fame chiefly rests, but on his *Letters,* which entitle him to a place among the foremost English letter writers. Though he could picture most entertainingly the society of his day, he was by no means careful about telling the truth, and the historic value of the *Letters* is thus lessened. Walpole set up a private printing press at Strawberry Hill and printed editions of his own works.

**WALPOLE,** Sir Robert, First Earl of Orford (1676-1745), an English statesman, one of the greatest finance ministers England ever had. He was born at Houghton, studied at Eton and at King's College, Cambridge, with a view to entering the ministry, but began a political career in 1701 with election to Parliament from the family borough of Castle Rising. In the next year he was returned from King's Lynn, and speedily became known as a distinct force in the ranks of the Whigs. In 1708 he was made Secretary of War, but two years later went out of office with his party and became a leading member of the Opposition. His political enemies accused him of corruption and succeeded in having him dismissed from the House and imprisoned in the Tower; but the unfounded attack only increased his popularity.

When George I came to the throne in 1714, Walpole's prospects brightened. As privy councilor, as paymaster-general of the forces and as Chancellor of the Exchequer he gained the king's signal favor, and although out of office again in 1717 he continued before the public by reason of his opposition to the South Sea Company. The bubble burst in 1721, and the country was brought to the verge of ruin; but Walpole, again made Chancellor of the Exchequer and First Lord of the Treasury, averted panic and reëstablished sound finance. From that date until 1742 he was the real ruler of the country, and exercised himself in maintaining peace abroad and commercial prosperity at home.

George I died in 1727, and Walpole's enemies hoped that he would be dismissed, but George II retained his father's minister, whose power was not materially lessened until 1737. From that time opposition to him and to his policies grew steadily, and there were several times when, had he been less determined to remain in office, he would surely have felt forced to resign. In February, 1742, he was raised to the peerage as Earl of Orford, and a few days later resigned his office, though George II continued to consult him on all important questions.

Again in his old age Walpole was accused of peculation, but the charges, as far as he personally was concerned, were false. He did, it is true, openly justify Parliamentary corruption, not as desirable, but as necessary; but he proved his own uprightness by leaving office poorer than when he entered it. A.MC C.

**WALRUS,** *wol'rus,* an animal of the North Polar regions whose name comes from a Scandinavian word meaning *whale horse.* The walrus resembles the seal, and when full grown is about ten feet long. Its distinguishing feature is its tusks, extensions of its two canine teeth which extend straight downward sometimes thirty inches. With these tusks the walrus grubs on the ocean bottom for its principal food—oysterlike animals, shrimps and marine vegetables. Working with its tusks and the vacuum soles of its feet, the walrus can climb an almost perpendicular iceberg. The tusks also arm it against polar bears. On its upper lip it has a mustache of thick bristles. The walrus is found in herds, near the shore or on large masses of floating ice. Its bellow can be heard for long distances. It is harmless if unmolested, but if one of a herd is attacked the whole number come to defend it.

THE WALRUS: BULL AND COW

**Usefulness.** The walrus is very valuable to inhabitants of the Arctic coasts. Its flesh gives them food; its fat, light and heat; its skin, clothes, thongs and boats; its tendons, thread and bowstrings; its teeth, hunting implements; the lining of its intestines, windows for ice huts. The oil, hide and tusks are commercial products, but the ivory is inferior to that of the elephant.

Consult Allen's *North American Pinnipeds.*

**WALTHAM,** *wol'tham,* MASS., a city in Middlesex County, noted as a manufacturing center of high-grade watches. It is situated on both sides of the Charles River, ten miles west of Boston, on the Boston & Maine Railroad and on interurban lines. Its population in 1910 was 27,834; in 1916, 30,570 (Federal estimate). Among the attractive features of the city are Prospect Hill, a park of 136 acres; Robbins, Fitch and Appleton parks, Waltham Common and several public playgrounds. The Charles River Reservation of forty acres, a part of the Metropolitan Park system, extends along the river, and the city has also the Beaver Brook Reservation of forty-three acres. Canoeing on the Charles River is a popular sport, and near the city is held an annual water carnival.

Waltham is the home of the Massachusetts School for the Feeble Minded (established in Boston in 1848), the first school of its kind in the United States, and of the Waltham Training School for Nurses, Notre Dame Normal Training School, and the Horological School, which teaches watchmaking and repairing. The benevolent institutions include the Leland Home for aged women and the Waltham and Waltham Baby hospitals. Among other prominent features are the public library, state armory and several churches.

Waltham manufactures more watches than any other city in Massachusetts, and its American Waltham watch factory is one of the largest of its kind in the world. The first complete cotton mills producing finished cloth from cotton were established in Waltham about 1814, and cotton cloth is now an important manufacture. The city has also large bleacheries and dye works. Other factory products are automobiles, pearl buttons, watchmakers' tools, iron- and brass-foundry products, woolen yarn, sweaters, canoes and chemicals.

Waltham was settled in 1640, and was a part of Watertown until 1738, when it was sepa-

rately incorporated. Parts of Cambridge and Newton were annexed in 1755 and 1849 respectively. It was chartered as a city in 1884, and in November, 1917, it adopted the city manager plan of government (see CITY MANAGER).

**WALTON,** *wawl'tun,* IZAAK (1593-1683), an English author, born at Stafford. At about the age of eighteen he went to London, where he became apprenticed to an ironmonger and later became a member of the Ironmongers' Company. From 1644 to 1651 he traveled about England as a very welcome guest in the homes of some of the most eminent clergymen, and for the remainder of his life he lived in retirement, spending much of his time in peaceful meditation and in pastimes which brought him close to nature.

During these years was published his famous *Compleat Angler, or the Contemplative Man's Recreation.* This work was intended actually to instruct its readers in the art of fishing, but is technically of little value; it is read and admired because from first to last it is full of a gentle humor and a delight in the charms of out-of-door life, but most of all because it consists of the reflections of an earnest, simple, sympathetic nature. Five editions of the *Compleat Angler* were sold during the author's lifetime; in the last of these appeared an added part on fly-fishing, contributed by Walton's intimate friend, Charles Cotton. Walton's other works include several poems and a few leisurely, informal biographies.

Consult Marston's *Walton and Some Earlier Writers on Fish and Fishing.*

**WALTZ,** *wawlts,* a round dance of joint German and French origin which became immensely popular on the Continent at the beginning of the nineteenth century. Introduction into England occurred in 1812, and into America about 1820. It is danced by any number of couples, the man placing his right arm around the lady's waist and holding her right hand with his left, with the arm almost horizontally extended from the body. The couples wheel on an axis of their own, at the same time advancing in a circular motion around the room. The introduction of the waltz led to a new school of music. The two Strausses (father and son) were the greatest composers of waltz music, but Chopin originated the higher art form. Many modern variations of the waltz have been adopted from time to time, but return to the original waltz has always followed. See DANCING.

**WAMPANOAG,** *wom pa no' ag,* or **POKANOKET,** *po ka no' ket,* a powerful tribe of North American Indians of the Algonquian stock, whose former home was the whole of Southern Massachusetts from Cape Cod to Narragansett Bay. At one time the tribe numbered 30,000, but the number was reduced to less than 1,000 by a terrible epidemic before the Pilgrims landed (1620). The sachem of the Wampanoags was the famous Massasoit. While he lived the tribe was friendly to the English, but a growing dissatisfaction ripened into war in 1675, under the leadership of Massasoit's son, King Philip, which resulted in the annihilation of the tribe. King Philip's son was sent with others to the West Indies and sold into slavery. See MASSASOIT; KING PHILIP.

**WAMPUM,** *wom' pum,* or *wawm' pum,* the name given to white and purple beads which were used as money among the American Indians. Wampum was not only a medium of exchange, however; it was, as well, the red

A WAMPUM BELT

The illustration is that of a belt given to William Penn by the Indians in Pennsylvania.

man's badge of wealth and position, an armor against his foes and an ornament to be worn on gala days. Longfellow, in *Hiawatha,* mentions the custom of using the wampum:

> From his lodge went Hiawatha
> Dressed for travel, armed for hunting;
> Dressed in deer-skin shirt and leggings,
> Richly wrought with quills and wampum;
> On his head his eagle feathers,
> Round his waist his belt of wampum.

White, to the Indian, meant health, peace and prosperity; purple, sorrow and condolence; and from shells of these colors he skilfully and patiently fashioned the tiny, cylindrical beads, stringing them on fine skin strands. The beads were about one-fourth of an inch long and half as wide, and a day's labor sometimes produced five twelve-inch strings. The purple were considered the more valuable. Because wampum, even well into the eighteenth century, was such an important medium of exchange between the Indians and English colonists, laws were passed establishing standard values for the beads. In some localities six beads equaled a penny; a six-foot string of beads, the accepted measure, were worth from five to ten shillings. Indian belts of wampum were often exchanged be-

tween the parties to a treaty or public agreement.

**WANAMAKER,** *wahn'a ma k'r,* JOHN (1838- ), an American merchant, capitalist and philanthropist, born at Philadelphia, Pa. After a brief school course in that city, he secured at fourteen a position as an errand boy in a bookstore, and until 1861 was a clerk in various Philadelphia stores. In that year he established with Nathan Brown the Philadelphia clothing store of Wanamaker & Brown, and in 1876 founded there a great department store. In a most vigorous campaign within three years he practically overcame all competition in that city and made his enterprise so successful that it soon was one of the largest houses of its kind in the world. In 1896 he established a similar store on a vast scale in New York City.

For many years he was active in politics, but repeatedly declined public offices, such as a Republican nomination for Congress and an independent candidacy for mayor of Philadelphia. In 1889, however, he accepted from President Harrison the position of Postmaster-General of the United States, and under his supervision the Department became for the first time in its history a model business organization.

As a worker in religious and philanthropic fields he has rendered valuable service. He founded in 1858, and ever since has supervised, the Bethany Sunday School of Philadelphia, which is now the largest in the United States. The same year he was chosen the first salaried Y. M. C. A. secretary in America. During the War of Secession he was one of the founders of the Christian Commission, and devoted much time and money to its work among the soldiers. As a member of the financial board of the Centennial Exposition of 1876, as one of the founders of the Presbyterian Hospital of Philadelphia and Bethany Dispensary, as originator and president of the first Penny Savings Bank, and as the donor of numerous Y. M. C. A. and college buildings in Asia, he has exerted an influence for good throughout a wide territory. In recent years he has frequently been called upon by the United States Government for advice in postal affairs, and in this field is considered a high authority. R.D.M.

**WANDERING JEW,** the subject of a medieval legend taking various forms, the best known of which is a German version, published in 1602. In this a Jew is represented as telling the Bishop of Schleswig that he was a cobbler in Jerusalem at the time of the Crucifixion and had joined in the mockings of the people; that he ordered Jesus to hurry on and not to rest, when, bearing His cross, He paused for a moment at his shop door, to which Jesus answered, "I will stop and rest, but thou shalt go on." From that time the cobbler had wandered about the earth. After the spread of the tale, many Jews who claimed to have lived since the time of Jesus appeared at different points in Europe. Several modern writers have made the story the subject of drama or romance. The most famous writing of this nature is Eugene Sue's *The Wandering Jew.*

Consult Conway's *The Wandering Jew.*

**WANDERING JEW,** a name given to certain species of the spiderwort family, because they cling to life tenaciously. These plants are found usually in greenhouses, but are also grown in hanging baskets in houses. If a small branch is placed in water it will put forth roots and grow indefinitely. The leaves of the wandering Jew have a shining, silvery tinge, and when exposed to an abundance of sunlight they become striped with cream or white and turn red-purple below. In the dim light of a greenhouse they are silvery green. The plants bear white, rose-red or blue flowers, and both leaves and stem are juicy. The plants are native to Mexico and South America.

**WAPITI,** *wop'i ti,* a species of deer living in the Northwestern United States and Canada. It is usually called *elk.* See ELK, subhead *The American Elk;* also DEER, where an illustration will be found.

**WAR,** a contest carried on between sovereign powers by force of arms by which each seeks to force its will upon the other. While war is the opposite of peace, it has for its definite object the establishment of peace, and the more vigorously war is prosecuted the more quickly, as a rule, may that object be attained. The causes of war, or the alleged causes, are many and various. War may spring from jealousy of power, from religious prejudices, from racial hatred, from mere lust of conquest, or from the impulse of a strong nation to help defend the weak. Whether it be between sovereign states or nations or between divided parties of the same people, war becomes an established fact only by the sovereign will of the people. Whether just or unjust, desirable or undesirable, or whether war could have been avoided, are considerations which have no bearing on the fact that war exists. Once acknowledged to exist, war and its conduct have been clearly defined by civilized nations, and

agreements have been reached stating what may be done and what may not be done in the carrying on of hostilities.

War is primarily a matter of destruction, and modern invention has been largely devoted to means by which the power of the enemy may be destroyed quickly and effectively. Modern rifles, cannon, machine guns, telegraphy, signaling apparatus, aeroplanes, balloons—all have taken a prominent place among the land forces leading to destruction. Railroads, the greatest builders of prosperity in peace time, become in war the most destructive assets of a nation. The sea, usually the highroad of commerce, combines with the railroads in providing the safest means of conveying soldiers to zones of conflict and of supplying the necessities of existence to the contending armies. The power that controls the sea routes has indeed a terrible advantage over the power that depends entirely on land forces; and the power that can control the sea and also deliver an effective blow on land will eventually dictate to the world.

War is not the action of an unorganized mob, without cohesion or definite plan, but is the intelligent coöperation of a disciplined army, acting under the direction of one will, with a definite object in view. It is said that in multitude of counsel there is safety, but in a multitude of orders there is confusion. Successful war is the result of the working together of trained minds, and in no modern pursuit is the advantage of the trained intellect more apparent than in war.

By whatever process a state of war has been arrived at, whether formally declared, stated to exist by manifesto, or entered into without preliminary formalities, certain usages and rights of war have come to be generally recognized. These usages permit the destruction or capture of the enemy's armed forces, both military and naval, the destruction of property likely to prove of use, interruption in forwarding supplies and the confiscation of everything needed for the support of an invading army. The enemy legally may be starved into submission by the stoppage of all food supplies. This method, striking at the nation itself as well as at its armed forces, makes that nation realize more fully than by any other means the horrors of war, and that it is indeed the opposite of peace. Though the enemy may be starved, women and children suffering perhaps more than men, it is expressly forbidden by international law to bombard defenseless towns, to illtreat civilians or to destroy property wantonly. Water supplies may be cut off, but water must not be poisoned; torture, to extort information, must never be resorted to; wounding and killing must be strictly confined to battle. The modern tendency has been to render war as humane as possible, but in the War of the Nations there were sad and costly departures from this rule.

Property at sea belonging to the enemy is subject to capture and confiscation wherever found, except in distinctly neutral waters. The United States has strongly resisted this international ruling, insisting that commercial shipping should in no case be interfered with. European powers, however, do not agree with the United States and claim that such humanity, while it may be magnificent, is not war.

**Cost of Wars.** From an economic standpoint wars are the most expensive undertakings in which man has ever engaged. This statement applies both to destruction of life and property and to expenditure of money. The tables listed below give the incredible sums spent by civilized nations in warfare in barely more than a hundred years.

*Cost to the United States.* Between the year 1812, when America waged its first important war as an independent nation, and 1917, when it entered into the War of the Nations, the government expended the following sums:

| | |
|---|---|
| War of 1812 (1812-1815) | $ 119,624,000 |
| War with Mexico (1846-1848) | 173,298,000 |
| War of Secession (1861-1865) | 3,478,121,000 |
| Spanish-American War (1898) | 1,901,926,000 |
| Grand total | $5,672,969,000 |

This sum, vast as it is, is not impressive when compared with the expenditures entailed by the War of the Nations. The special war session of Congress, convened by President Wilson in April, 1917, voted appropriations amounting to $21,300,000,000, of which it was planned to spend $12,067,278,679 within the first year of the conflict. In other words, it cost the government over twice as much to finance the first year of the war of 1917 as it did to finance four other wars from beginning to end.

*Cost of European Wars.* Up to August, 1917, the expenditures of the belligerents in the War of the Nations were as follows:

| | |
|---|---|
| Entente Allies | $59,421,500,000 |
| Teutonic Allies | 30,300,000,000 |
| Total | $89,721,500,000 |

A comparison of the above total with the figures for the wars waged between 1793 and 1914

indicates the titanic aspect of the conflict which set Europe aflame in 1914:

| DATES | COUNTRIES ENGAGED | COST |
|---|---|---|
| 1793-1815 | England-France | $ 6,250,000,000 |
| 1812-1815 | France-Russia | 450,625,000 |
| 1828 | Russia-Turkey | 100,000,000 |
| 1830-1840 | Spain and Portugal civil war | 250,000,000 |
| 1830-1847 | France-Algeria | 190,000,000 |
| 1848 | Revolts in Europe | 50,000,000 |
| 1854-1856 | England | 371,000,000 |
| | France | 332,000,000 |
| | Sardinia and Turkey | 128,000,000 |
| | Austria | 68,600,000 |
| | Russia | 800,000,000 |
| | France | 75,000,000 |
| 1859 | Austria | 127,000,000 |
| | Italy | 51,000,000 |
| 1864 | Denmark, Prussia and Austria | 36,000,000 |
| 1866 | Prussia-Austria | 330,000,000 |
| 1864-1870 | Brazil, Argentina and Paraguay | 240,000,000 |
| 1865-1866 | France-Mexico | 65,000,000 |
| 1870-1871 | Germany | 954,400,000 |
| | France | 1,580,000,000 |
| 1876-1877 | Russia | 806,547,489 |
| | Turkey | 403,273,745 |
| 1900-1901 | Transvaal republic and England | 1,000,100,000 |
| 1904-1905 | Russia-Japan | 2,500,000,000 |
| 1912-1913 | Balkan Wars | 1,264,000,000 |
| Total expenses, wars from 1793 to 1914 | | $24,587,546,240 |

**Opinions of Prominent Men.** In writing of war, some of the world's greatest men have given opinions well worth mention and consideration. Napoleon Bonaparte, the world's greatest general, wrote, "The more I study the world, the more I am convinced of the inability of force to create anything durable." Victor Hugo said, "A day will come when the only battle field will be the market open to commerce." George Washington wrote, "My first wish is to see the whole world at peace." Thomas Jefferson declared, "I abhor war, and view it as the greatest scourge of mankind." General Sherman said, "War is hell." F.ST.A.

Consult Wilson and Tucker's *International Law;* Brewer's *Rights and Duties of Neutrals:* Jordan's *The Human Harvest: A Study of the Decay of Races through the Survival of the Unfit;* Jordan's *War and Waste.*

**Related Subjects.** The following wars are treated in special articles in these volumes. With many of the articles lists of related topics are given, so that the range of reading indicated is a wide one:

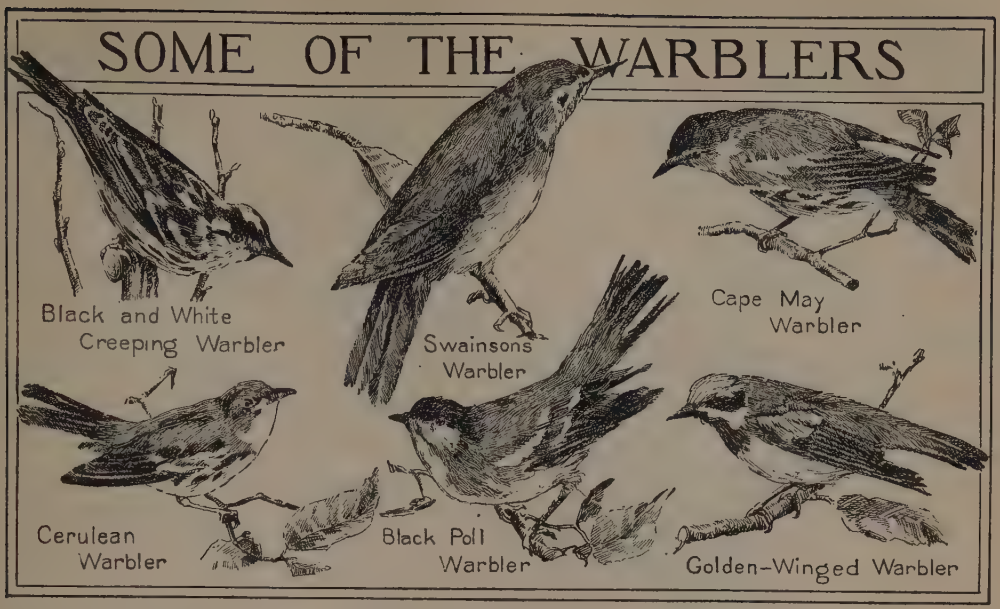
Balkan Wars
Chinese-Japanese War
Crimea, subhead *Crimean War*
Crusades
Franco-German War
French and Indian Wars
Hundred Years' War
Mexican War
Peasant War
Peloponnesian War
Persian Wars
Revolutionary War in America
Roses, Wars of the
Russo-Japanese War
Russo-Turkish Wars
Sepoy Rebellion
Seven Weeks' War
Seven Years' War
South African War
Spanish-American War
Succession Wars
Thirty Years' War
War of 1812
War of Secession
War of the Nations

The reader may also consult the articles ARMY and NAVY, and their lists of related topics.

**WAR'BECK,** PERKIN (1474-1499), a pretender to the English Crown in opposition to Henry VII. He claimed to be Richard, the younger of the two royal princes whom Richard III imprisoned in the Tower and murdered. He found a few supporters, and Mary of York, dowager duchess of Burgundy, welcomed him as the real heir to the throne. James IV of Scotland gave Warbeck his cousin, Catherine Gordon, in marriage. In 1497 Warbeck made an unsuccessful expedition into England, was captured, but treated leniently. However, he continued to plot, and in 1499 Henry VII caused him to be executed at Tyburn.

**WAR'BLERS,** a group of tiny, insect-eating birds, found throughout the Western Continent, numbering about a hundred species. Seventy of these reach the United States. Warblers are not commonly noticed, because of their small size and their habit of keeping to the foliage, but to the lover of birds their varied plumage of soft, attractive coloring and their active movements make them a source of unending interest and delight. Their migration is late, and in May and early June groups containing different species may be seen in trees about buildings. In nesting, however, most species retire to the woods, some penetrating as far north as the Hudson Bay and Yukon regions. Their nests are usually cup-shaped, firmly built of twigs and grasses, woven together and placed in trees. The eggs are from three to five in number, of a whitish color, with brownish markings at the larger end. Many species have fine singing voices; others only weak, lisping notes.

Some of the better known species of wood warblers are the *yellow warbler,* which is abundant in parks and orchards; the *black and white warbler,* which creeps along the branches of trees; the *myrtle warbler,* marked with four yellow patches on head, rump and wings; the *American redstart,* a vivid bird of black with salmon markings; the *Blackburnian warbler,* with bright orange throat; the *black-throated green* and the *black-throated blue warblers* and the *oven bird.*




**Related Subjects.** The following warblers are given specific treatment in these volumes:

| | |
|---|---|
| Chat | Redstart |
| Oven Bird | Stonechat |

**WARD.** This word, in its origin, is a mere variant of *guard,* and in several of its meanings the relationship of the two terms is evident.

(1) *In law,* a ward is a minor who has been placed under a *guardian,* or responsible person whose legal duty it is to protect the minor's rights. The father is the child's natural guardian, but if a child has property and has no father, the courts are privileged to appoint a guardian. In these circumstances the ward must obey his guardian; he cannot marry or embark on any business enterprise without the consent of the latter, nor can he bring suit against his guardian, even if he feels that his rights are not being protected. In such a case, however, he may file a complaint with the court, and the court will call the guardian to account. In most instances, wardship ceases with marriage; in any case, it ceases when the ward becomes of age.

(2) *In politics,* the term *ward* is applied to one of the divisions of a city. In olden times such divisions were constituted for purposes of protection or guarding, but to-day they owe their existence to governmental conditions. A village or a town becomes a city largely because it desires, through divisions into wards, to secure for each part of its population a just representation in the council or other legislative body. Each ward elects to this body usually two aldermen, who make it their duty to see that in all the activities of the city the district which they represent is given due consideration.

**WARD,** Artemus. See Browne, Charles Farrar.

**WARD,** Elizabeth Stuart Phelps (1844-1911), an American novelist, born in Boston. When she was but four years old her father was made professor of homiletics in the theological seminary at Andover, Mass., and in that village she grew up. Her education was received in private schools and from her father, who used to discuss with her subjects far beyond the comprehension of most girls of her age. After leaving school she devoted herself for several years to mission work in a factory settlement near her home, and the influence of this work is seen in many of her books.

In 1864 a war story, *A Sacrifice Consumed,* appeared in *Harper's Magazine,* and from that time on she was a frequent contributor to that periodical. *Gates Ajar,* which was issued in 1868, was her most popular story. It centered about the question of life after death, and received much adverse criticism; but about 100,000 copies were sold in the United States, and more than that number in England, while French, German, Dutch and Italian editions were issued. Her other works include *Jack the Fisherman, A Silent Partner, A Singular Life, Story of Avis* and *Dr. Zay.* After her marriage

in 1888 to Herbert Ward, she wrote several books in conjunction with him, including *The Master of the Magicians, Come Forth* and *The Lost Hero*. Mrs. Ward's books are invariably careful in workmanship, interesting in plot and helpful in their purpose.

**WARD,** Mrs. Humphry (Mary Augusta Arnold) (1851- ), the foremost woman novelist in late English literature. Mrs. Ward and her Swedish and American contemporaries, Selma Lagerlöf and Edith Wharton, are ranked by many critics as the most brilliant women writers of the twentieth century. Mrs. Ward, who is the niece of the famous Matthew Arnold, is one of the most widely read of all present-day novelists. Her novels reflect the current movement of English thought; they are essentially stories of to-day, focused around the great problems—religious, political, or social—with which the modern age is concerned. She was born in Tasmania, but was reared and educated in England. In 1872 she married Thomas Humphry Ward, an author and journalist. After 1880 they lived in London.

MRS. HUMPHRY WARD

Her first literary efforts were contributions to periodicals; it was not until 1888 that her first successful novel, *Robert Elsmere,* appeared. This brought upon her a storm of disapproval, as she was regarded as a destroyer of Christian faith. Since that time her fertile mind and active pen have presented to her devoted reading public numerous other works, among them *The History of David Grieve, Marcella, Eleanor, Lady Rose's Daughter, The Marriage of William Ashe, Fenwick's Career, Diana Mallory, The Case of Richard Meynell, The Coryston Family, Eltham House* and *England's Effort* (1916). Despite her phenomenal popularity she is criticized for the lack of variety in her characters and for a deficiency of humor and spontaneity. At the same time she has the gift for vivid and interesting narrative, and her style and method of construction are admirable.

**WARD,** John Quincy Adams (1830-1910), an American sculptor whose work is typically American in spirit and characterized by strength and simplicity. He was born at Urbana, Ohio, and studied in Washington and New York. Before the War of Secession he made portrait busts of many of the great leaders in public life. In 1865 he modeled the statuette *The Freedman,* which became so popular that thousands of copies of it were sold. A trip through the Indian country provided him with sketches for his *Indian Hunter,* one of his finest sculptures, now in Central Park, New York City. Among the other examples of his work found in this city are a bronze statue of Shakespeare, a seated figure of Horace Greeley, and statues of George Washington and Thomas Jefferson. His group *The Good Samaritan,* commemorating the discovery of the use of ether as an anesthetic, is in Boston. Ward was actively identified with the noted art organizations of his day; and strove unceasingly to bring to his life work the highest ideals.

**WAR DEPARTMENT,** an executive branch of the government of the United States, created by act of Congress in 1789. It has control over the army, and until 1798 also had supervision of the navy. The President of the United States is commander-in-chief of the army, but the routine of management is in the hands of the Secretary of War, a member of the President's Cabinet, who receives a salary of $12,000 a year. He is appointed by the President, with the consent of the Senate, and ranks third in the line of succession to the Presidency. Of the men who have held this important office the best known are Henry Knox, Henry Dearborn, James Monroe, William H. Crawford, Lewis Cass, William L. Marcy, Jefferson Davis, Edwin M. Stanton, William T. Sherman, Elihu Root and Newton D. Baker. To none of these men did greater responsibilities fall than to Secretary Baker, for he was at the head of the War Department when America joined the allies in the War of the Nations, and it was his task to direct the work of raising the great national army—a task that involved grave problems and the working out of a multiplicity of details.

**The Secretary of War.** This officer has charge of all military affairs, the survey, improvement and fortification of harbors, and the administration of insular possessions of the United States. Since 1890 he has had the aid of an assistant secretary, whose salary is $5,000 a year. The actual management of army affairs is in the hands of the general staff (see

ARMY, subhead *United States*), and high army officers, usually of the rank of brigadier-general or major-general, are detailed for service in the management of the department. These officers, who are the heads of bureaus, are the adjutant-general, through whom orders affecting the regular army and the organized militia are issued, the inspector-general, the judge-advocate-general, quartermaster-general, surgeon-general, chief of engineers, chief of ordnance and chief signal officer. The United States Military Academy at West Point and the military parks and cemeteries at Gettysburg, Chickamauga, Arlington and other places are under control of the Secretary of War. See CABINET. W.F.Z.

**WAR'FIELD,** DAVID (1866- ), an American actor who is said to be without a rival in the portrayal of a certain type of character. His specialty is the rôle of a kindly, elderly man who is somewhat eccentric, but always noble-hearted and courageous. As the Jew in *The Auctioneer* and the old musician in *The Music Master,* Warfield is known to countless admirers as one who moves his audiences equally to tears and to laughter, and he does this by acting that is the perfection of simplicity.

He was born in San Francisco, and in that city began his theatrical career as a minor actor in one of the local theaters. In 1890 he went to New York, and for the next ten years played in the Casino Theater and in Weber & Field's Music Hall. His skill in impersonating "types" won for him the favorable notice of David Belasco, who starred him in *The Auctioneer.* This play served as a vehicle for him from 1900 to 1903, and was successfully revived several years later. *The Music Master* (1903-1907) was equally popular, and was revived and enthusiastically received in 1917. Another notable success, *The Return of Peter Grimm,* was produced in 1911. Warfield was somewhat less successful in *Van der Decken* (1916), based on the legend of the Flying Dutchman.

**WAR GAME,** or **KRIEGSPIEL,** *kreeg'speel,* a popular game in Germany, played with a map and colored metal blocks representing soldiers. The game is extensively played in the German army and is undoubtedly of great value in teaching the tactical movement of troops. The maps are drawn on large scale, the blocks of troops on the same scale. Infantry, cavalry, artillery, engineers, signalling corps, every branch of the army is represented.

There are usually two players on each side. The armies take the field, and the blocks representing the troops are moved as in a definite plan of campaign. The distance troops may move is decided, and two minutes are allowed between each move on alternate sides. When two bodies of troops come in contact, the weaker is considered beaten and withdrawn from the field. When bodies of equal numbers meet, dice are thrown to decide the winner.

This game was introduced, in a somewhat modified form, into the United States, but it did not acquire popularity. It presents some of the same problems that occur in chess.

**WAR'NER,** CHARLES DUDLEY (1829-1900), an American editor, critic and essayist, born at Plainfield, Mass. He was educated at Hamilton College, spent two years with a surveying party in Missouri, was admitted to the bar and afterward practiced law in Chicago. In 1860 he removed to Hartford, Conn., where he was editor first of the *Press* and later of the *Courant.* From 1884 until his death he was connected with *Harper's Magazine,* contributing first "The Editor's Drawer" and after 1892 "The Editor's Study." *My Summer in a Garden,* the published collection of humorous sketches which first made him prominent, was followed by *Backlog Studies, Being a Boy, As We Were Saying,* and many other volumes. Among his novels are *A Little Journey in the World* and *That Fortune; The Gilded Age* is a drama written in conjunction with Samuel L. Clemens. Warner edited the "American Men of Letters" series, and *A Library of the World's Best Literature.* He was an author of rare humor, and wrote most entertainingly and instructively of his extensive travels. The last forty years of his life were spent in Hartford, where he was neighbor to Mark Twain and Mrs. Stowe.

**WAR'NER,** SETH (1743-1784), an American soldier and patriot, and one of the leaders of the Green Mountain Boys in the War of Independence. He was born in Roxbury, Conn. At the age of twenty he settled in Bennington, Vt., where he and Ethan Allen, in 1765, were leaders of a band of Green Mountain Boys who opposed the officers sent by the governor of New York to expel settlers from the New Hampshire grants. These Vermont patriots were among the bravest soldiers of the Revolution. Warner was elected lieutenant-colonel of the Green Mountain Boys in 1775, and in the following year he was appointed colonel of a Continental regiment. He took part in the capture of Crown Point, in the Montgomery expedition to Canada and in the battles of Hubbardton and Bennington. In 1782 he was forced to abandon his military career because of failing health.

## THE STORY OF THE WAR OF 1812

**WAR OF 1812,** also known as the SECOND WAR FOR AMERICAN INDEPENDENCE, was fought between Great Britain and its former colonies, the new republic of the United States. It began twenty-nine years after the treaty of peace was signed which ended the Revolution, and was the only war in which the United States has been engaged which did not begin in April. After the passing of a hundred years the actions of England which precipitated the war may be viewed in a clearer light than was possible early in American history. That country did not have a friendly feeling for the United States; the upstart republic had whipped proud Britain, and the sting of defeat and loss was yet felt. Moreover, England was engaged in a life-and-death struggle with the greatest military despot the world had ever seen, and it felt that superhuman effort was needed if the nation were to survive.

**Causes of the Conflict.** The first open acts to arouse the nation were not intended to be hostile, but were considered military necessities in Great Britain. That country was in 1806 in the midst of its long struggle with Napoleon, emperor of the French. Britain gave notice in that year that the sea was to be blockaded from Brest, France, to the mouth of the Elbe, to cut off French commerce. Napoleon retaliated with what was known as the "Berlin Decree."

A new English order followed which declared that any neutral vessel bound for France should (1) enter a British port and pay duty on its cargo or (2) undergo search at sea for contraband of war. Napoleon met this repressive measure with his "Milan Decree," which prohibited all world trade with Great Britain and her colonies and ordered any vessel seized which should submit to British search. France was not powerful enough to make its decrees effective, but Britain was able to police the seas in such force that neutral commerce was nearly destroyed. The effect upon the United States was disastrous. English warships practically blockaded American ports, stopped outgoing vessels in search of contraband and took from them seamen who were alleged to be British subjects, to impress them into the home country's navy to fight Napoleon.

The United States Congress in 1807 passed a Non-Importation Act, which shut out British goods from American markets; this intensified public sentiment, for it injured the states nearly as much as it did England. Protests were lodged against the right of search and especially against the impressment of seamen, but these were not heeded. Events reached a crisis when in 1807 a British vessel fired upon an American ship, killed or wounded twenty-one of its crew and seized four sailors; one of them was hung as a deserter. Jefferson, then President, said that "this outrage rouses the United States to a pitch of excitement not equaled since the Battle of Lexington." To emphasize the displeasure of the nation the President ordered all British ships from United States waters, and Congress demanded reparation. The three surviving sailors were returned to their ship by the English authorities, but nothing else towards conciliation was offered. It was known that many of the seamen taken from American vessels from time to time were Americans, but Britain's policy remained unchanged.

Anticipating further unfriendly measures, Congress passed the Embargo Act, a measure which proved obnoxious and which threatened secession of the New England States. The act forbade United States vessels to leave home ports; officially it was explained that this would preserve them from capture and at the same time deprive the Europeans of food supplies they were obliged to secure from overseas and drive them to make terms by which the states would secure their rights.

The Embargo Act, strengthened by later legislation, embroiled the country in angry discussion. It was rapidly destroying industrial life, in New England, especially, and bringing thousands to the verge of want; its opponents hit upon a happy phrase to describe its effects by spelling the word backwards and calling it the "O-grab-me" Act. One of the laws passed to strengthen the embargo was known as the Force Act (1809); it forbade loading any cargo without an official permit and then only under the watchfulness of a revenue officer. To prevent resistance the military and naval forces were authorized to enforce its provisions. New England suffered so severely that it threatened to make a separate bargain with England on all points, and even to leave the Union and unite with Canada.

These acts did not have the effect in Europe that was intended. Both England and France welcomed them, each thinking their operation would weaken the other. In 1809 the acts were repealed, and a Non-Intercourse Act was passed, which opened commerce with all countries except France and Great Britain (see page 4245). In the midst of the alarming situation Jefferson retired from the Presidency and James Madison succeeded him.

A month after Madison's inauguration Britain announced it would suspend all Orders in Council directed against the United States; in return, the Non-Intercourse Act was suspended, and peaceful relations were promised. However, for reasons not made known, England's orders were not repealed; they were made more stringent. Congress passed the Macon Act, forbidding trade with any nation showing itself hostile to the United States. Napoleon was about to confiscate millions of dollars' worth of American shipping, but in the Macon Act he saw an opportunity to serve his interests, so he manifested every evidence of friendship, with the result that President Madison revoked all trade restrictions against France and strengthened those against England.

The irritating and oppressive measures imposed by England were not abated, and could no longer be endured. In a summary of offenses against the United States President Madison, in advocating war, laid the following charges against the government of Britain:

(1) The impressment of American seamen into the British navy.

(2) Virtual blockades of United States waters.

(3) The Orders in Council, which drove the commerce of the states from the seas.

(4) The belief that British agents had instigated several Indian outbreaks in the West (which ended in the defeat of the Indian Tecumseh by William Henry Harrison).

New England and some of the Middle States were opposed to war. While the debate on the war resolution was pending, but unknown to America, the obnoxious Orders in Council were repealed, upon the insistent demand of English merchants. War was declared June 18, 1812, and by reason of the turn of events the only important issue upon which it was fought was the impressment of seamen.

## *Story of the War*

**Attitude of the Nation.** Division of opinion respecting the events of six years preceding the war was not ended by the debates in Congress on the war resolution. In the Senate nineteen votes favored war; thirteen opposed the resolution. In the House seventy-nine voted for war and forty-nine were against it. The resolution passed by a majority of only thirty-six.

The country was ill prepared for a hostile demonstration or for defense; preparation was woefully inadequate. The Treasury contained but little money, for revenues had shrunk because of the crippling of commerce. The army numbered but 10,000 men at the outset; many of the soldiers were recent recruits, almost wholly untrained, and competent officers were few. In the navy, to be pitted against the world's sea power, were only eight frigates, two sloops and five brigs.

**Harrison's Indian Campaign.** Reference was made above to the belief that prior to the war British agents had persuaded the Indians of the West to form a league against the nation. Tecumseh was the leader of the red men in the enterprise. William Henry Harrison, governor of the great Indiana territory, had purchased from scattered tribes a vast region in the Wabash valley. Tecumseh demanded that it be ceded back to the Indians, on pain of warfare if it were not done. Harrison believed war inevitable, and in the autumn of 1811 he advanced upon Tippecanoe, an Indian village, routed its defenders and burned it. The victory frustrated the formation of a powerful Indian confederation which might have been a source of much danger. During the next three years thousands of Indians gave the British effective aid, but united action on a colossal scale was defeated.

FIELDS OF OPERATIONS IN THE NORTHWEST

An outline of the leading events of the war follows:

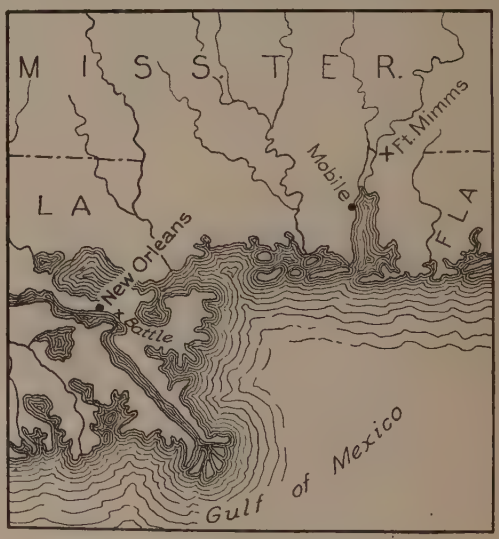
**Campaign of 1812.** After the declaration of war General Hull, governor of Michigan territory, was ordered to invade Canada. His 1,800 men were defeated, driven back home, and reduced to 800 men; his army surrendered Detroit and Michigan to General Brock on August 16. Another invasion of Canada from Niagara failed, although no more territory was lost.

On the sea the navy, on which little reliance had been placed, achieved a series of unexpected victories. The frigate *Constitution* defeated the British *Guerriere* and was thereafter known as "Old Ironsides;" the sloop *Wasp* captured the brig *Frolic;* the frigate *United States* captured the frigate *Macedonian,* and the *Constitution* was again successful, this time taking the frigate *Java.* A swarm of privateers, commissioned by Congress, preyed upon British commerce so persistently that their captures in 1812 alone totaled over 300 vessels.

**1813 Was Indecisive.** Alternate successes and reverses marked the year, the chief glory going to the navy, as in the preceding year. In January a small army of 900 men was defeated at River Raisin, south of Detroit, and many of the prisoners were massacred by the Indians, whom the English could not restrain. York, Canada, now Toronto, was captured in May by 1,600 Americans. The most important battle of the year was won by General Harrison, who defeated the British and Indians at the River Thames, in Canada. The Indian Tecumseh was killed in the fight. Michigan territory was thus fully restored to the United States, for the Battle of Lake Erie, a month earlier, had cleared the Great Lakes of the foe.

Commodore Oliver Hazard Perry built on Lake Erie a fleet of five vessels, bought three schooners and joined these to one small boat he had captured from the British; with this fleet of nine boats he defeated six British ships on September 10; this was one of the most brilliant victories of the war. Perry sent to General Harrison the message, which has become famous, "We have met the enemy, and they are ours." On the ocean the *Hornet* captured the *Peacock,* and the *Enterprise* captured the *Boxer.* A loss to the republic occurred when the *Chesapeake,* under Captain Lawrence, was defeated by the British frigate *Shannon.* Lawrence, dying from wounds, admonished his men, "Don't give up the ship!" but the adversary won the battle.

**The Third Year of War.** In 1814 the conflict took on a sterner aspect. Both sides fought more stubbornly, and the English, with the close of the Napoleonic wars, were able to dispatch



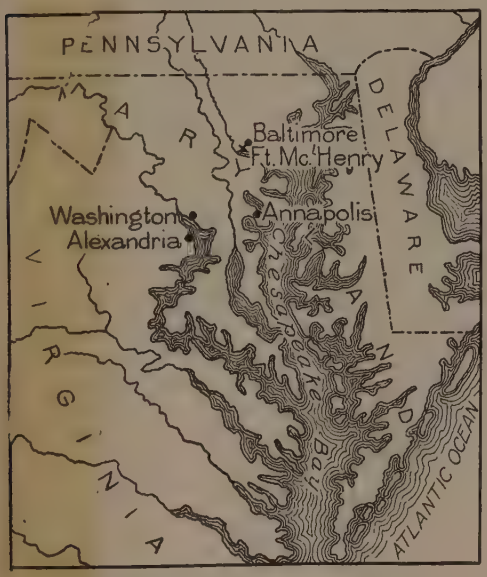

SOUTHWESTERN BATTLE REGION

additional veteran troops across the Atlantic. The Niagara frontier was again a center of operations; on July 5 the British were defeated at Chippewa by General Brown, and twenty days later at Lundy's Lane, by Brown and Winfield Scott.

Down from Canada came fresh British troops, who laid siege to Plattsburg, held by General Macomb. The British forces had the support of a fleet on Lake Champlain, as also had the Americans. The two fleets met in battle on September 11; the Americans, under Commodore Macdonough, whipped the British so thoroughly that the English army found its position jeopardized, and it retreated to Canada.

In August a British fleet entered Chesapeake Bay with 5,000 soldiers under General Ross. He marched on Washington, took the city on the twenty-fourth without encountering serious resistance, and burned the Capitol, the Executive Mansion and a few other government buildings. The government fled into the Virginia woods for safety. On September 12 and 13 an attack was made on Baltimore by the British ships and army; it ended in failure, Ross was killed, and the event gave to the American nation the song, *The Star-Spangled Banner*. On the sea the Americans lost the frigats *Essex* and *President*, but they took seven from their enemy.

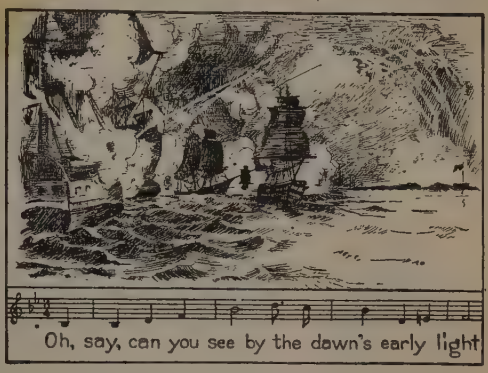
*The Needless Battle.* Although peace was declared on December 24 by a treaty signed at Ghent, Belgium, the news did not cross the Atlantic in time to arrest a decisive action in the South. General Pakenham, with 12,000 men, landed in Louisiana and attacked New Orleans. The city was defended by General Andrew Jackson and 5,000 men; they defeated the invaders in a series of battles which began December 31 and culminated in the final attack on January 8, 1815. Over 2,500 British soldiers were killed, including Pakenham; Jackson lost seven killed




CHESAPEAKE BAY REGION

and six wounded. The wide difference in losses was due to the fact that the British had to fight without protection, while the Americans were fortified by earth intrenchments and piles of cotton bales, which had been commandeered and hastily formed into a fortification.

**The Hartford Convention.** The war had been strongly opposed from the beginning by the people of New England. They regarded it as unnecessary, and charged that it was waged because of prejudice against England and of partiality for France. They suffered immense losses through destruction of their commerce and their fisheries, and felt that the government was doing nothing to protect them from the enemy. A meeting of protest was called to meet at Hartford, Conn., December 15, 1814. It met in secret sessions for three weeks, and but for the announcement of the end of the war its effects might have been far-reaching and disastrous.




BOMBARDMENT OF FORT McHENRY

**Treaty of Ghent.** England was nearly exhausted by the continuance of the Napoleonic wars and several times suggested peace with America. In the summer of 1813 commissioners from the two countries met at Ghent, Belgium, and discussed peace for a year and a half. Finally, on December 24, 1814, terms were arranged and a treaty was signed. The commissioners representing the United States were Henry Clay, John Quincy Adams, James A. Bayard, Albert Gallatin and Jonathan Russell.

The treaty provided for restoration of all land captured by either side, leaving ownership as it existed before the war, and for the appointment of a commission to determine the boundary between Canada and the United States. There was no reference to the chief cause of the war—the impressment of American seamen—but England never again raised the question.

E.D.F.

Consult Johnson's *History of the War of 1812-1815*; Barnes' *The Hero of Erie*; Abbott's *Blue Jackets of 1812*.

**Related Subjects.** The following articles in these volumes will explain many references in

the above discussion and will also furnish added information:

Brock, Sir Isaac
Champlain (lake)
Constitution, The
Continental System
Contraband
Embargo, subhead *Embargo Act*
Erie, Lake, subhead *Battle of Lake Erie*
Ghent, subhead *Treaty of Ghent*
Harrison, William H., subhead *Governor of Indiana Territory*
Hartford Convention
Hull, William
Jackson, Andrew, subhead *As a Soldier*
Lawrence, James
Lundy's Lane, Battle of
Madison, James, subhead *The War of 1812.*
Milan Decree
Non-Intercourse Act
Pakenham, Sir Edward M.
Perry, Oliver H.
Queenston Heights, Battle of
Raisin River, Massacre of
Search, Right of
Star-Spangled Banner
Tecumseh
Thames River, Battle of the
Tippecanoe, Battle of
United States, subhead *The War of 1812*

**WAR OF SECESSION,** a conflict between a divided people in the American republic, growing out of the institution of slavery. Its causes can be traced back through much of the preceding history of the United States, but the clash of arms was averted until 1861. Through four years the struggle continued; in 1865 it was terminated by the defeat of the side which had risen in defense of slavery.

The sections involved had been popularly and appropriately referred to since colonial days as the North and the South. They had been equally zealous in the cause of American independence; history records greater Revolutionary activity on the part of the North, but this was due solely to geographical conditions and to the strategy of war. Several decisive battles were fought in the South, and in a Southern state the final surrender of the British occurred. The underlying causes which forced the sections apart were differing economic conditions.

Slavery had existed in America since 1619, in which year a Dutch trader sold a boatload of black people as slaves to Virginia planters. The traffic continued for a hundred and fifty years without attracting political notice, and during that time it spread in the North as well as in the South. In 1790—two years after the adoption of the Constitution of the United States—there were over 40,000 in slavery north of the Mason and Dixon's Line; Massachusetts alone had no slaves. Economic conditions in the North did not favor the retention of slaves, but in the cotton-growing South slave labor was an important factor in the industry. Thus while the North was emerging from slave holding the number of slaves in the South increased from 700,000 to over 2,000,000 between 1790 and 1830, and to more than 4,000,000 by the year 1860—about one-eighth of the entire population.

The slavery question could not be kept out of the Constitutional Convention of 1787; the factions compromised their differences by a clause in the document which prohibited the importation of slaves forever after twenty years (1808). This led to an increased value being set upon each slave—from an average price of $500 in 1830 to $1,200 to $1,500 in 1860.

**Direct Causes of the War.** The South cannot be held responsible for the institution of slavery, for from the beginning its legality was recognized by each of the thirteen colonies. Slavery was profitable in the South, and it was unprofitable in the North. In 1820 the power of the slave states and of the free states was about equal in Congress, and a struggle began to maintain that equality, at least; each faction was alert to prevent the other from securing strong political advantage. Neither the North nor the South can be censured for this attitude. The South was blamed by the North for attempting to push slavery into a part of the vast, unoccupied national domain, but the South had a like grievance against the North which sought to extend antislavery views into the same sections.

The endeavor to maintain a balance of power is shown in the admission of states. In 18

Ohio was admitted; in 1812, Louisiana. Then, swinging back and forth came Indiana, Mississippi, Illinois, Alabama, Maine, Missouri, Arkansas, Michigan, Florida, Texas, Iowa. The Missouri Compromise (1820) sought a solution of the territorial question, in the following provision:

> Missouri was empowered to form a state government without prohibition of slavery, but thereafter no slavery should exist in any part of the Louisiana Purchase north of latitude 36° 30′.

This law calmed the contending factions for a number of years; it was in force until the passage of the Kansas-Nebraska Bill, in 1854.

The real grievances of the South were not always expressed in Northern legislation; many irritating circumstances increased the bitterness between the sections. For example, it was held that Northerners were aiding in unlawful acts in helping slaves to escape from their masters and flee to Canada (see UNDERGROUND RAILROAD); that Northern legislatures, in passing laws which

IN THE WEST

made ineffective the Fugitive Slave laws of Congress, violated the Constitution; that Congress could not legally pass antislavery legislation, yet it continually received and made public hundreds of petitions asking for such illegal action; that, finally, the South felt it was right to secede from the Union because the Constitutional guarantees had been repeatedly broken by the North and hence were no longer binding.

The Northern argument was to the effect that there was a higher law than any made by man, and it was right to limit to the smallest possible bounds what the North considered an evil. Northerners helped slaves to escape on the ground that their masters had no moral right to them, and that to assist the negroes in obtaining their freedom was a service to humanity.

Another phase of the quarrel did not touch the question of slavery, but was purely economic. The North was assuming the character of a manufacturing community, while the South became more and more agricultural. The tariffs placed upon imported manufactures for the protection of American industries increased the cost of commodities. The South's only interest was as a consumer, and its people demanded lower tariffs. South Carolina rebelled and declared the tariff acts of 1828 and 1832 null and void, so far as they related to that state, and President Jackson was obliged to use stern measures to defeat nullification. The question of a state's right to nullify any law of the nation which was contrary to local interests was based on the assumption that the United States was a union of independent commonwealths and that the general government was merely their agent (see STATES' RIGHTS). Entertaining such views, it seems not so strange that when the breaking point was reached the states of the South should have felt themselves free to assert their independence and to form a new government. The North, on the contrary, assumed the Federal government to be supreme, believed the Union to be inseparable and secession a plain violation of the national compact.

**Movement towards Disunion.** The Presidential election in the autumn of 1860 resulted in the choice of Abraham Lincoln for President over three other candidates, and in this there was no comfort to the South. It was inevitable that there must be disunion, if the slave-holding states were to maintain what they proclaimed to be their rights. The first step towards a separate government for them was taken in a convention called to meet in Columbia, S. C., on December 17, 1860. Because of an epidemic in that city the meeting was held at Charleston, on December 20. Here the following Ordinance of Secession was passed:

> We, the people of the State of South Carolina, in convention assembled, do declare and ordain, and it is hereby declared and ordained, that the ordinance adopted by us in convention, on the twenty-third day of May, in the year of our Lord 1788, whereby the Constitution of the United States was ratified, and also all acts and parts of acts of the General Assembly of this State ratifying amendments of the said Constitution, are hereby repealed; and that the Union now subsisting between South Carolina and other States, under the name of the United States of America, is hereby dissolved.

The new Confederacy began to assume tangible form on the day that South Carolina

seceded. The table below shows the rapid progress of the movement.

| STATE | ACT OF SECESSION | VOTE |
|---|---|---|
| South Carolina. | Dec. 20, 1860 | Unanimous |
| Mississippi .... | Jan. 9, 1861 | 84 yeas, 15 nays |
| Florida ..... | Jan. 10, 1861 | 62 yeas, 7 nays |
| Alabama ..... | Jan. 11, 1861 | 61 yeas, 39 nays |
| Georgia ..... | Jan. 19, 1861 | 208 yeas, 89 nays |
| Louisiana ..... | Jan. 26, 1861 | 113 yeas, 17 nays |
| Texas ..... | Feb. 1, 1861 | 166 yeas, 7 nays |
| Virginia ..... | Apr. 17, 1861 | 88 yeas, 55 nays |
| Arkansas ..... | May 6, 1861 | 69 yeas, 1 nay |
| North Carolina. | May 21, 1861 | Unanimous |
| Tennessee ..... | June 8, 1861 | Unanimous |

When the Charleston convention adjourned it was voted that the same delegates and those from such other states as should join South Carolina should meet on February 4, 1861, at Montgomery, Alabama. In that city, on February 18, the government of the Confederate States of America was organized, with Jefferson Davis as President and Alexander H. Stephens as Vice-President. The new President had been a United States Senator from Mississippi until his state joined the Confederacy. Stephens believed a state possessed the right to secede, but he advised against it. However, when his state, Georgia, left the Union, he resigned his seat in the national Congress and went with it. The Confederate Cabinet was filled by appointment of the following men, not all of whom served through the four years of its existence:

Secretary of State, Robert Toombs.
Secretary of Treasury, C. G. Memminger.
Secretary of War, L. Pope Walker.
Secretary of Navy, Stephen R. Mallory.
Attorney-General, Judah P. Benjamin.
Postmaster-General, John H. Reagan.

The capital was located at Richmond, Virginia. The Confederate Congress, at the height of its power, numbered twenty-six Senators, including two each for a short time from Missouri and Kentucky, and 106 Representatives. There were four sessions of the Provisional Congress, the first assembling on February 4 and the last on November 18, 1861. The permanent Congress held two sessions. The first assembly was on February 18, 1862; it held four sessions and adjourned on the same date, in 1864; the second met May 2, 1864, and held two sessions, concluding its work on March 18, 1865.

The following record of events of the war includes mention of the major operations and leaves to special articles (see *Related Subjects* at end) the story in its more minute details.

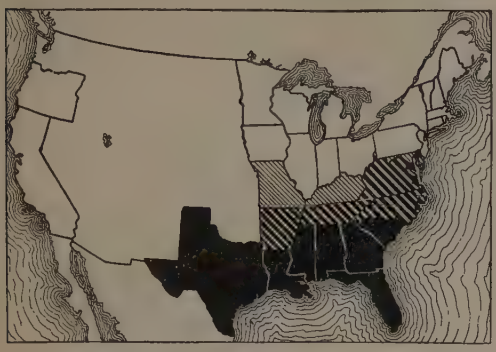
## *Progress of the War*

**Status of Government Property.** The seceding states at once took possession of government property within their borders and sent a commission to the United States government to arrange suitable terms of payment. The South declared it possessed an interest in all government property, North and South, and proposed settlement for what lay within its borders on a proper exchange basis. President Lincoln would not thus treat with the commissioners; he based his refusal upon the ground that states could not secede, and he proceeded to send supplies to the support of the small garrison in Fort Sumter, in Charleston harbor. By order of the South Carolina legislature the Federal vessel was fired upon and forced to retire. The legislature further declared that any other attempt to reënforce the garrison would be considered an act of war. Lincoln dispatched a fleet to Charleston with orders to reach the fort, peaceably if possible, but forcibly, if passage was disputed. The fort was fired upon before the arrival of the fleet, and Major Anderson retired with the honors of war.

**The Massing of Armies.** The combat appeared unequal at the start. The resources of the North were infinitely greater than those of the South. In the South there were about one-fourth as many white men as there were in the North; the wealth of the two sections showed even greater disproportion. The South prepared for serious warfare to maintain its new Confederacy; Lincoln called for 75,000 troops to quell insurrection, and when it was discovered that the seceding states possessed strength to resist, Congress called for 500,000 enlistments "for three years, or for the duration of the war."

**The War in 1861.** The Federal authorities prepared at once to occupy the states nearest to the Confederacy—the "border states"—to prevent them from joining the secession movement. They also planned to capture Richmond and to blockade the Southern coast, that the Confederacy might be deprived of aid from Europe, in the form of supplies. The first serious engagement was on July 21, in which the Confederates defeated the Union forces at

Bull Run and threatened the city of Washington. It ended for a time all hope of marching on Richmond. McClellan was placed in command of the Army of the Potomac, and he began at once to make a strong army out of



THE WAR MAP

How the Confederacy was enlarged after the fall of Fort Sumter. In black are shown the states which seceded before the fall of Sumter; heavily-shaded lines mark the states which later joined the Confederacy; lightly-shaded lines mark border states that remained in the Union, to which, after 1863, West Virginia was added; states in white represent the Federal side of the war. The large, undivided area was unorganized territory in 1861.

the thousands of raw volunteers. By autumn the Union forces numbered 180,000 men; the Confederates, 150,000.

In November the Confederacy dispatched two commissioners, Mason and Slidell, from the port of Havana, Cuba, to England, to plead for aid for the South. The men were taken from the steamship, the *Trent,* by Federal Commander Wilkes and imprisoned. England threatened war, the alternative being the release of the prisoners. President Lincoln admitted the illegality of the act, released the men and offered apology to Britain. Mason and Slidell reached Europe, but their mission was fruitless.

**The War in 1862.** The plan of campaign of the Union armies included the program of 1861; in addition, to open the lower Mississippi, break the Confederate line in the West, march an army through the heart of the Confederacy and then northward into Virginia. Then the invading host would join the Federal armies in the East for an attack on Richmond, in case that city yet remained in Confederate hands.

Captain, later Admiral, Farragut, with about fifty wooden vessels of war, the strongest fleet that had ever been assembled under the American flag, attacked the strong defenses of New Orleans from the south. The assault lasted a week, and the city fell. Vicksburg and Port Hudson, both fortified, could not be taken except with the aid of troops. Their capture did not occur until July, 1863; on that date the Union controlled the great river.

In the East McClellan advanced to the capture of Richmond. The battles of Yorktown, Williamsburg, Seven Pines, Fair Oaks and other lesser engagements resulted in no glory to the Federals, for the Confederates under Lee captured many prisoners and forced McClellan back towards Washington, after he was actually in sight of the Confederate capital city. Lee pressed his advantage, advancing towards the Potomac, threatening Washington and winning in the second battle of Bull Run. At Antietam (September 17) one of the greatest battles of the war was fought, and Lee was driven back into Virginia. McClellan did not press his advantage, and he lost his command to Burnside, who fought Lee at Fredericksburg and was defeated. Hooker succeeded Burnside.

The Confederates surprised the Federals by making of the old frigate *Merrimac* a formidable iron-plated, roof-topped warship. It feared no vessel of standard type afloat, and easily sank its first victims, on March 9. But the Federals also had prepared a surprise, the *Monitor*—a "cheesebox on a raft"—a heavily-armored craft, hardly visible above the water line, with an iron-coated revolving turret. The battle of these strange boats, which resulted in a victory for the *Monitor* and in a day changed the type of war vessels for the world, is described on page 3890.

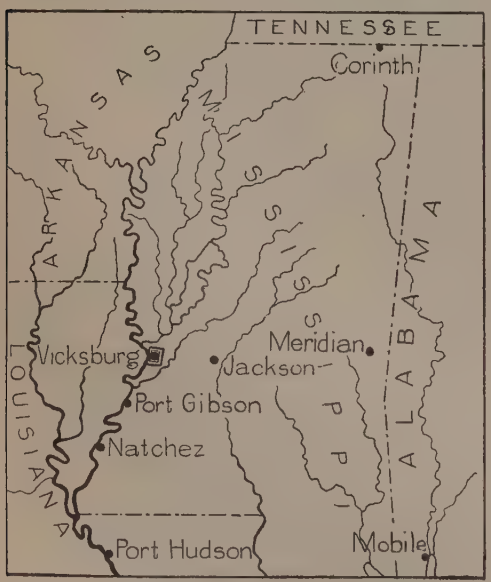
In the West the theater of war was principally in Tennessee. The Confederate line was strong from Kentucky to Columbus, Mississippi. The Federal General Halleck determined to break this line and enter the heart of the South. For the first time General Grant appears in an important undertaking; Halleck sent him to attack Fort Henry, but Commodore Foote captured it with his gunboats before Grant could reach the scene, and the latter moved on to Fort Donelson (see map). It was here that Grant wrote his famous message, "No terms except an unconditional and immediate surrender can be accepted." He won. Then he moved into Mississippi, engaged the Confederates at Shiloh, or Pittsburg Landing; at first he was driven back (April 6), but on the second day, with reënforcements, he achieved another victory, and his name was thereafter the greatest in Federal annals.

On the last day of 1862 and the first two days of 1863 Rosecrans fought and won a victory at Murfreesboro, Tenn.

*Proclamation of Emancipation.* The war was given a different character by action of President Lincoln before the close of the year. After the nominal victory at Antietam Lincoln issued a proclamation declaring it to be his intention in 100 days to free the slaves in all seceded states which had not by the end of that period laid down their arms. This announcement, made public on September 22, expressly stipulated that slavery would not be disturbed in the states which decided to return to their former place in the Union.

The South rejected the overtures, and on January 1, 1863, the final proclamation was issued, freeing, so far as was in the power of the Federal government, nearly 4,000,000 slaves. The immediate effect was to solidify both North and South and make the great issue clear. Lincoln had entered the war with no intention of destroying slavery, but after two years he declared such a military measure to be necessary. The majority of the negroes remained on the plantations.

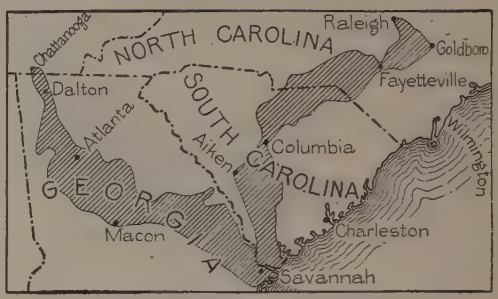
**Events of 1863.** In May the Federals, now commanded by Hooker, again started to hammer their way towards Richmond. At Chancellorsville (May 2-3) they were decisively defeated, but the victory cost the Confederates




THE REGION AROUND VICKSBURG

"Stonewall" Jackson, who was killed. Emboldened by his success, Lee again invaded the North, and at Gettysburg, one of the "fifteen decisive battles of the world," Meade met him and in a memorable three-days' conflict drove him back. This defeat marked the turning point of the war.

Farragut did not complete the task of opening the Mississippi in 1862. In the next year there was concerted action by water and land against Vicksburg and Port Hudson, the two remaining river strongholds. Grant defeated Pemberton, drove him into Vicksburg, then




SHERMAN'S MARCH TO THE SEA

The shaded area shows the width of the path cut through the heart of the Southland.

besieged the city. For seven weeks the city resisted, with such suffering as probably did not occur elsewhere during the war. On July 4, the day following the Union victory at Gettysburg in the East, the city surrendered; five days later Port Hudson was taken, and the Union was master of the Mississippi.

In July Rosecrans captured Chattanooga, then pursued Bragg to Chickamauga, a little to the south, in Georgia, gave him battle and was defeated. Here, Thomas, the "Rock of Chickamauga," saved the Union army from destruction; its survivors returned to Chattanooga and were besieged by Bragg, who held Lookout Mountain and Missionary Ridge. In three memorable battles in November the Confederates were driven from these strongholds, and they retreated into Georgia. Sherman, under Grant, made it impossible for the Confederates to return to the attacks around Chattanooga by raiding across Mississippi and destroying their lines of communications at Meridian. The successes of the year raised Grant to the post of general-in-chief early in 1864. Sherman was his efficient second in command.

In the summer the ranks of the Union army needed additions, that the plans of the leaders should not fail. Volunteers did not respond in sufficient numbers, and conscription was resorted to. This was so unpopular that in numerous places, New York City, especially, draft riots occurred.

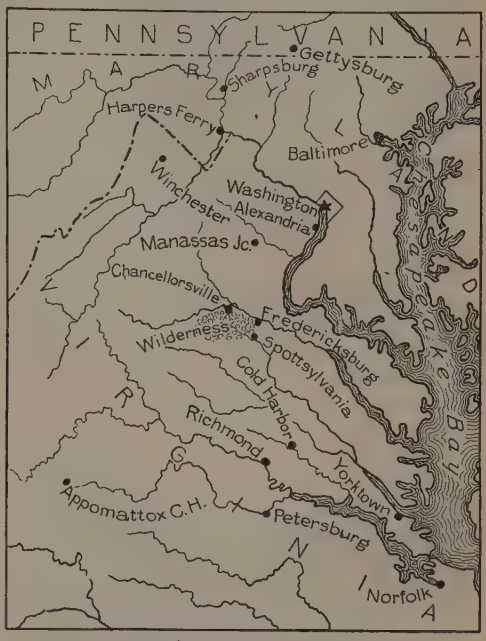
**The Year 1864.** The decisive victories at Gettysburg and Vicksburg in 1863 had encour-

aged the Union commanders to hope for a speedy conclusion of the war, and a "hammering campaign" was projected for 1864. Lee guarded Richmond; Johnston held the central South safe from the Federals by virtue of a strong force in Northern Georgia. Grant determined to address himself to Lee and the capture of Richmond; to Sherman he assigned the task of defeating Johnston and then to march across the South to the sea. The two commanders began their campaigns on the same day. Sherman fought Johnston at Resaca, Dalton and Kenesaw Mountain in May and June, driving resistlessly forward, with Atlanta, the central South's chief city, as his objective. He entered Atlanta September 2, and nearly destroyed it. Then began the famous march "from Atlanta to the sea."

The Confederates hoped to draw him back to support Thomas, who was threatened at Nashville, but in this they did not succeed. Thomas destroyed Hood's army in two battles, Franklin and Nashville, and Sherman proceeded on his course, cutting a path sixty miles wide through the heart of the Confederacy. It was the most spectacular event of the war. On December 22 he captured Savannah and turned northward on February 1, 1865, to unite with Grant.

In the East in May and June Grant fought the forces of Lee, Longstreet and other leaders of the Confederacy in seven days' battles in low, tangled underbrush and swampy lands known as the "Wilderness." Never to be forgotten were the struggles at Spottsylvania, Cold Harbor, and other fields leading to Richmond. Grant lost over 60,000 men; a less determined leader would have slackened his pace, but he declared he would "fight it out on that line if it took all summer." And it did require all that summer, and longer; Lee retreated into Richmond and fortified himself, and Grant circled the city, located his center south of Petersburg, and laid siege to the capital. Burnside mined the Confederate works at Petersburg, and when the mine was fired the Union forces rushed forward to force their way into Richmond, but were stopped by the deadliness of the resistance offered.

In order to draw some part of the Confederate forces from the defense of Richmond, Sheridan engaged Early's Southern troops in the Shenandoah Valley. The former was successful at first, but later Early attacked the Federals at Cedar Creek, while Sheridan was absent—"at Winchester, twenty miles away." His hurried ride to the front, where he changed a threatened defeat into victory, has been made familiar to every child in the poem by Thomas Buchanan Read (see page 4936). Sheridan laid waste the valley, to separate Lee's army from its source of supplies.




EASTERN THEATER OF WAR

In June the famous raider *Alabama* was sunk in a battle with the *Kearsarge* off the coast of France.

**The End of the War.** Lee was shut up in Richmond with about 40,000 men; the besiegers had over 100,000 troops. Grant captured Petersburg April 2, 1865; Lee evacuated Richmond the next day, and the Federals entered the capital. President Davis escaped to North Carolina. On April 9 Lee surrendered what remained of the Confederate army, at Appomattox Court House, seventy-five miles west of Richmond.

President Davis fled farther south. On May 11 he was captured in Georgia, was imprisoned at Fortress Monroe for two years and was then released. Gradually, by proclamations of amnesty (see page 238), those who had been engaged in the rebellion were restored to their full rights of property and citizenship.

**Death of President Lincoln.** Joy in both North and South over the termination of the war was turned to mourning when on the evening of April 14, five days after the surrender of

Lee, the President was shot by John Wilkes Booth, an actor, in Ford's Theater, Washington. He died early the next morning without recovering consciousness. His death was as truly mourned in the South as in the North; there was a feeling that the people of the late Confederacy had lost a sincere friend.

Lincoln had, indeed, mapped out his plans for reconstruction, and they were lenient, as might have been expected. Had he lived, the troublesome reconstruction period might have been passed through with much less unfairness and ill-feeling. Johnson, contrary to expectations, attempted to carry out Lincoln's policies, but the opposition of Congress and his own lack of tactfulness prevented a successful outcome.

**Cost of the War.** The South suffered from the conflict infinitely more than did the North, although the two sections were as one in the loss of men who would never return to their firesides. The North enlisted a total of 2,667,-

APPOMATTOX COURT HOUSE

000 men who saw service in the field, in addition to nearly 50,000 who were recruited and held in reserve. The Confederates enlisted about 1,400,000 men during the four years. The Federals had at most 1,000,000 men in the field at one time; the Confederates, about half as many. There were 360,000 casualties in the Union forces; 110,000 men were killed in action or died of wounds, and 250,000 died of disease or from privation. The Confederate losses were 95,000 in killed and fatally wounded; from disease and privation, about 165,000. These records are as exact as compilations make them possible. Nine-tenths of the men in the South served the Confederacy; four-ninths of the Northern men were in the Union army.

Industry was nearly killed in the South, and its commerce was destroyed, owing to the Federal blockade. In the North business was not decreased, but in many lines was heavily increased, and commerce did not suffer severely. There was slight invasion of the North, while, on the contrary, the South bore the stress of battle and suffered from invasions and raids which are inseparable from the prosecution of war.

In money the North spent during the four years more than $3,500,000,000, and in the years since 1865 has distributed in pensions to disabled Union soldiers a sum nearly as large. The cost of the war to the Confederates was about $2,000,000,000. L.B.E.

Consult Grant's *Memoirs;* Formby's *The American Civil War;* Jefferson Davis's *Rise and Fall of the Confederate Government;* and *The Battles and Leaders of the Civil War,* by numerous participants in the struggle.

**Related Subjects.** These volumes contain numerous articles on events connected with the War of Secession. The following list indicates not only the principal battles and the soldiers and statesmen most closely involved, but many of the happenings leading up to actual war:

Abolitionists
Alabama, The
Andersonville
Antietam, Battle of
Atlanta, subhead *History*
Bull Run, Battles of
Carpetbaggers
Chancellorsville, Battle of
Chattanooga, Battle of
Confederate States of America
Dred Scott Decision
Emancipation Proclamation
Fort Henry and Fort Donelson
Fredericksburg, Battle of
Fugitive Slave Laws
Gettysburg, Battle of
Kansas-Nebraska Bill
Kenesaw Mountain, Battle of
Mason and Dixon's Line
Missouri Compromise
Monitor and Merrimac
Murfreesboro, Battle of
Nullification
Petersburg, Siege of
Reconstruction
Shiloh, Battle of
Slavery
Spottsylvania Court House, Battle of
States' Rights
Tariff
Trent Affair
Underground Railroad
United States, subtitle *Summary of United States History*
Vicksburg, Battle of
Wilderness, Battle of the
Wilmot Proviso

BIOGRAPHIES

Bragg, Braxton
Burnside, Ambrose E.
Butler, Benjamin F.
Davis, Jefferson
Early, Jubal A.
Farragut, David G.
Foote, Andrew H.
Grant, Ulysses S.
Hood, John Bell
Hooker, Joseph
Jackson, Thomas J.
Johnston, Albert S.
Johnston, Joseph E.
Lee, Robert E.
Lincoln, Abraham
Longstreet, James
McClellan, George B.
McDowell, Irvin
Mason and Slidell
Meade, George G.
Pemberton, John C.
Polk, Leonidas
Rosecrans, William S.
Sheridan, Philip
Sherman, William T.
Stephens, Alexander H.
Thomas, George H.

**WAR OF THE NATIONS**, also called the GREAT WAR and the WORLD WAR, a struggle engaged in by more than twenty nations, and unmatched in history for its titanic character. In the staggering totals of money expended, in the incredible development of engines of war, in the number of men engaged, in the lists of dead and wounded, the total of the wars of a thousand years, summed up in all their horrors, cannot equal the cost, destruction and misery of the conflict which broke upon the world on July 28, 1914. It developed into the greatest of all human efforts; never before has there been anything like the same volume of energy directed to given objects. Never before was there such an intricate plot, such a universal play of passions as the nations began to witness. The outcome no man can foresee, for generations to come are destined to be affected by its events and their sequels. Only after the treaties of peace are signed and men begin to repair what has been destroyed in material and in ideals will the long train of inevitable consequences, good and bad, begin to be apparent.

**The Nations Engaged.** The great tragedy will appear in truer proportions, the "far-flung battle line" will be the more impressive if in the beginning of the story of the war the nations engaged are listed in the order in which they became involved. The chronological arrangement follows:

**1914**

| | | |
|---|---|---|
| Austria-Hungary, on Serbia | July | 28 |
| Germany, on Russia | Aug. | 1 |
| Germany, on France | Aug. | 3 |
| Germany, on Belgium | Aug. | 4 |
| Great Britain, on Germany | Aug. | 4 |
| France, on Germany | Aug. | 4 |
| Austria-Hungary, on Russia | Aug. | 6 |
| Montenegro, on Austria-Hungary | Aug. | 7 |
| Montenegro, on Germany | Aug. | 9 |
| Serbia, on Germany | Aug. | 9 |
| France, on Austria-Hungary | Aug. | 10 |
| Great Britain, on Austria-Hungary | Aug. | 12 |
| Japan, on Germany | Aug. | 23 |
| Austria-Hungary, on Japan | Aug. | 27 |
| Austria-Hungary, on Belgium | Aug. | 28 |
| Russia, on Turkey | Nov. | 3 |
| France, on Turkey | Nov. | 5 |
| Great Britain, on Turkey | Nov. | 5 |

**1915**

| | | |
|---|---|---|
| Portugal, on Germany | Mar. | 10 |
| Italy, on Austria-Hungary | May | 23 |
| San Marino, on Austria-Hungary | June | 2 |
| Bulgaria, on Serbia | Oct. | 13 |
| Great Britain, on Bulgaria | Oct. | 15 |
| France, on Bulgaria | Oct. | 16 |
| Russia, on Bulgaria | Oct. | 19 |
| Italy, on Bulgaria | Oct. | 19 |

**1916**

| | | |
|---|---|---|
| Germany, on Portugal | Mar. | 8 |
| Austria-Hungary, on Portugal | Mar. | 15 |
| Italy, on Germany | Aug. | 27 |
| Rumania, on Austria | Aug. | 27 |
| Germany, on Rumania | Aug. | 28 |

**1917**

| | | |
|---|---|---|
| United States, on Germany | Apr. | 6 |
| Cuba, on Germany | Apr. | 8 |
| Panama, on Germany | Apr. | 9 |
| Greece, on Germany | July | 22 |
| Siam, on Germany | July | 22 |
| Liberia, on Germany | Aug. | 7 |
| China, on Germany | Aug. | 14 |
| Brazil, on Germany | Oct. | 26 |
| United States, on Austria-Hungary | Dec. | 7 |
| Panama, on Austria-Hungary | Dec. | 10 |

Not all the nations named declared war with the expectation of active participation in it on European battle fields. Some were actuated by the political aim of giving support to friendly powers, as San Marino, which is surrounded by Italy; Panama, where the United States has immense interests; Cuba, in sympathy with the United States and to prevent German espionage on its soil; China, in alignment with Japan and probably in remembrance of German ill treatment during the Boxer uprising.

In addition to the list of actual belligerents, the following countries severed relations with Germany in 1917, because of injuries sustained or to give moral support to other nations:

| | |
|---|---|
| Bolivia | Honduras |
| Costa Rica | Nicaragua |
| Ecuador | Peru |
| Guatemala | Santo Domingo |
| Haiti | Uruguay |

The United States did not declare a state of war with Turkey and Bulgaria during 1917, for the necessity of such an act was not apparent. Turkey's relations with America were broken on April 21, after a state of war was declared with

its principal ally. The so-called Germanic powers against which all the other nations were arrayed were—

| | |
|---|---|
| Austria-Hungary | Bulgaria |
| German Empire | Turkey |

Considered from the standpoint of population, the nations which directly entered the war against the central powers (as they were called because of their central position in Europe) possessed within their home territories and in their overseas possessions, on whose resources they could draw, over three-fourths of the world's population. Again, it should be pointed out that untold millions of these intended to take no active part, but their influence was nevertheless a moral force. Tabulated, the populations ranged themselves as follows:

| | |
|---|---|
| Against central powers | 1,335,307,000 |
| Broke with central powers | 33,014,000 |
| Anti-German | 1,367,321,000 |
| Germanic Allies | 156,572,000 |
| Neutral Nations | 166,853,000 |

## *Causes of the War*

The dread specter of a general war in Europe, with the possibility of even wider ramifications, had hung over all governments for more than a dozen years. At least twice widespread hostilities were narrowly averted—in 1906, when France and Germany settled the vexed Moroccan question, and when the Balkan Wars were fought, in 1912 and 1913. It was with difficulty that in the latter disturbances the struggle was localized; its results made more delicate the general situation. During the Russo-Japanese War, in 1904-1905, although not known publicly until a dozen years later, the emperor of Germany endeavored to persuade Russia to enter into a secret alliance with the German Empire, which would have forced France to join them to preserve its Russian alliance and consequently disrupt its friendly relations with England. This is but one example of a vast amount of intrigue which Germany, especially, engaged in before the outbreak of the war.

**A General Survey.** There were deep and potent reasons why a clash at arms was inevitable. Some of the underlying conditions which existed may be summed up in the following statements:

(1) There was growing jealousy in Germany over England's commercial supremacy. This led to the construction of a powerful navy by the former country, all within twenty years. For seventy-five years Great Britain has ruled the seas. Its fleet could have blockaded every port of importance in the world during all of that period, but its power was never exerted; the freedom of the seas was never in doubt. It even put the policy of free trade into its own government. Germany was fast becoming a commercial power, and for years has been getting ready to dispute with Britain for supremacy.

(2) Conflict of Teuton and Slav. The race antagonisms growing out of the complexities of South-Central Europe furnished, at last, the excuse for resort to arms.

(3) Growing antagonism between democracy and militant autocracy.

(4) Excessive armaments, becoming more formidable every year, in which race Germany set the pace on the Continent; in self-defense other nations were obliged to assume a like burden. England was never a military power; it relied upon its navy to ward off any blows which threatened the island. Central Europe became the hotbed of militarism.

(5) Bitterness between Germany and France over the seizure by the former of Alsace-Lorraine, at the end of the Franco-German War (1871). The "lost provinces" never were happy in their new relation, and Germany never admitted them to membership among the states of the Empire.

(6) Desire to put an end to internal strife in the so-called central powers—Germany and Austria-Hungary—by uniting the people through the agency of a short, victorious foreign war.

(7) Personal ambition of the ruling class and of the landed class in Germany—the *Junkerthum*—to spread German influence.

(8) Publication of many books in Germany extolling the blessings of war, calling it a necessity in the furtherance of "kultur."

(9) Grasping hands of Teuton and Slav turned toward Constantinople, Asiatic Turkey and Persia, seeking territory, influence and a southern sea outlet. In this phase France and England participated to the extent of endeavoring to maintain a semblance of "balance of power."

(10) Formation of alliances, obviously for "safety first," which would make it impossible to localize the conflict when it should begin.

**A Closer Scrutiny.** In the above tabulation of political conditions the light is focused strongly upon Germany. The course of events in the drama which has been enacted for years has shown definite determination of the German Empire to achieve an object upon which its rulers had centered their thought—world domination. There is high German authority for the existence of a comprehensive plan, to be worked out with traditional German thoroughness, after due preparation.

In the archives of the United States Navy Department, Record 38, Volume 52, page 558, is a report made by Commodore (later Admiral)

Dewey soon after the Battle of Manila (1898). He reported a conversation with the German Admiral Von Goetzen, after a German attempt to profit from Dewey's exploit, in which the admiral said:

> About fifteen years from now my country will start a great war. She will be in Paris in about two months after the commencement of hostilities. Her move on Paris will be but a step to her real object—the crushing of England. * * * Some months after we finish our work in Europe we will take New York and probably Washington and hold them for some time. We will put your country in its place with reference to Germany.
>
> We do not propose to take any of your territory, but we do intend to take a billion or so of your dollars from New York and other places. The Monroe Doctrine will be taken charge of by us, as we will then have to put you in your place, and we will take charge of South America as we wish to. * * * Don't forget this—about fifteen years from now remember it, and it will interest you.

This authentic record commands admiration for the exactness of its prophecy; it is startling, also, in the light of later events. The impression persists that the intended victims of this threat either believed it the bombastic utterance of a disappointed officer or they thought it would be possible to avert a world calamity. Certain it is that the United States and England were not seriously stirred, and France made no defensive move until in 1913 increased military activity in the open in Germany forced it to provide for additions to its army.

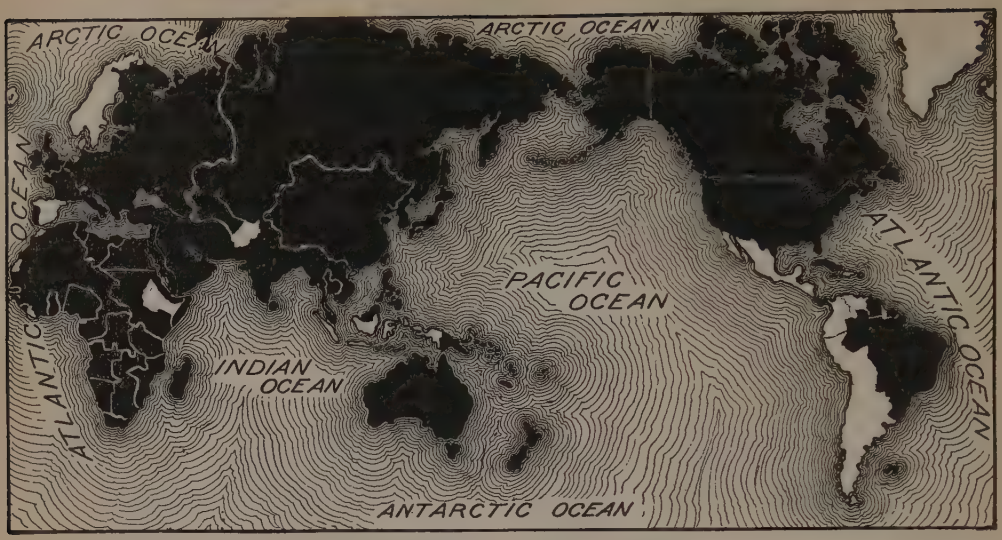
**The Complex Racial Problem.** That there may be a clearer understanding of the dire events which followed one another in bewildering succession in the summer of 1914, a study of the racial map of Europe (pages 504, 2097) is essential. Differing racial ambitions always breed political complexities, and the two are here found in antagonism, between Teuton and Slav. Russia is the great Slav power of the world, and as such it has exercised immense influence in the Balkan states, which are largely Slavic, but there Austrian influence is also powerful. Serbia was charged with fostering aspirations to weld the Slavic populations into a pan-Slavic union which would lessen Austrian influence. So diverse were the interests of the people of the Austro-Hungarian Empire that well-directed efforts might crumble that government and force a realignment of peoples by races rather than by arbitrary political boundaries. The Teutons in Austria-Hungary—and they number over half of the people—were aligned with Germany; the Slavs, with Russia. Austria knew its danger; the spread of the idea of Slavic union threatened its existence.

The treaties closing the Balkan Wars (1913) left unrest in their wake. Serbian territory was enlarged; Turkey was left only a little corner of Europe; Bulgaria lost territory which had been won the year before. There were new and conflicting interests which could not be reconciled. German influence has long been paramount in the Austro-Hungarian Empire; the two powers have long harbored a *Mittel Europa* ambition—to make all middle Europe Teutonic and open a pathway to Asia Minor and the Indian Ocean. The Balkan settlement threatened disaster to this plan.

In the foreground are the Austrian-Serbian antagonism; in the background, Germany, Austria's ally, and Russia, friend of Serbia.

**Two Pistol Shots.** On June 28, 1914, the Austrian crown prince, Archduke Francis Ferdinand, and his wife were assassinated at Sarajevo, capital of the Austrian province of Bosnia, by Gavrilo Prinzip, a Serbian. The Austrian government maintained that the crime was instigated by the government of Serbia, in spite of strong denials, and in this attitude was supported by Germany. Two years later, in the midst of war, it was charged by members of the German Reichstag in one of its sessions that in the imperial palace of Potsdam, Prussia, on July 5, 1914, a decision was reached that there should be war. Austria was to present such demands upon Serbia because of the double crime that that country could not accept them without base humiliation. Whatever the facts regarding this alleged meeting, Austria's ultimatum was indeed severe; on July 26 it was dispatched, and acceptance was demanded on the following points within forty-eight hours:

> (1) The Serbian government to give assurance that it was not in conspiracy against the Austro-Hungarian monarchy, and that such statement be published in the Serbian official journal. (Serbia accepted this demand.)
>
> (2) That the published declaration should express regret that Serbian officers had engaged in anti-Austrian demonstrations, and that the Serbian government should take summary action against all who had participated in such demonstrations. (Accepted by Serbia.)
>
> (3) That the declaration should be communicated by the king of Serbia to his army as an order of the day and published in the official bulletin of the army. (Accepted.)
>
> (4) That all papers which had incited hatred of Austria should be suppressed. (Accepted.)
>
> (5) That the society styling itself Narodna Obrana (National Union) should be dissolved and its property confiscated. (Accepted.)




A WORLDWIDE CALL TO ARMS

The countries indicated by the black areas became directly interested in the war through declarations of hostile attitude. The white areas represent neutral countries; some of these nations suffered acutely.

(6) That methods of education in Serbia which fomented feeling against Austria-Hungary should be eliminated. (Accepted.)

(7) That officials and officers guilty of propaganda against Austria-Hungary be dismissed, the Austrian government to have the right to name such officers and officials. (Accepted, subject to proof.)

(8) That officials of the Austro-Hungarian government should assist Serbia in suppressing in Serbia the movement against the integrity of the Austro-Hungarian government and take part in the judicial proceedings in Serbia against persons implicated in the Sarajevo crime. (Rejected unconditionally, as destroying the sovereignty of a free state.)

(9) That Serbia furnish Austria-Hungary with explanations of utterances of high Serbian officials who ventured to speak ill of the Austro-Hungarian government after the Sarajevo crime. (Accepted, conditionally, subject to proof, and suggestion of mediation if reply was not satisfactory.)

Serbia's attitude towards all points of the ultimatum is indicated in the parenthetical remarks. It was thought by all the powers during the forty-eight hours in which the little kingdom was given to reply that it could not humiliate itself by acceptance, and the telegraph wires of Europe were loaded with dispatches from one power to another in an endeavor to avoid hostilities. France was concerned as an ally of Russia, England as an ally of France and Russia, Italy as an ally of Austria and Germany, and Germany as the mentor of Austro-Hungarian politics, and that country's powerful ally. England, France and Russia were bound together in the Triple Entente (which see); Germany, Austria-Hungary and Italy formed the Triple Alliance (which see).

Austria-Hungary rejected the prompt reply of Serbia, declaring that it failed to meet the demands which had been made. On the 28th of July it declared war.

**Their Positions Stated.** Austria-Hungary officially excused itself for precipitating the war on the ground that the Serbians and Montenegrins were at all times plotting against the dual monarchy with the avowed intention of separating its Slavic provinces from their allegiance and destroying its political integrity, and that the murders of the future emperor and his wife were inspired by Serbian officials with that end in view.

Serbia protested that the legitimate aspirations of the kingdom had always been retarded and to a great extent prevented by the unfriendly attitude of Austria-Hungary; that the latter had wrongfully annexed Bosnia and Herzegovina (1908), inhabited by Slavs and close kinsmen of the Serbs; and that Austria had assumed an attitude hostile to Serbia in the recent Balkan Wars.

**Why the Conflict Spread.** Russia at once made it known that it considered its own interests as inseparably linked with those of Serbia and the smaller Slav states in the Balkans. It declared its purpose to mass its troops for war the day Austrian troops crossed the Serbian border. It was the general belief that

Austria thought Russia did not mean what it said and that it would not dare to attack the strong central powers; Austria well knew that if Russia adhered to its threat all Europe would be plunged into war, and it appeared incredible that any nation would deliberately force a conflict so tremendous. The Russian attitude affected France and England, as members of the Triple Entente. Germany announced itself in favor of localizing the dispute—which meant to permit Austria-Hungary to punish Serbia and exact from that country what it pleased; the result would inevitably strengthen the *Mittel Europa* propaganda. At all events, Germany would support its ally. Italy announced that it would remain neutral; its relation to the Triple Alliance did not obligate it to join in any action unless a member of the alliance was attacked, and Italians would not join in a war of aggression.

The Russian mobilization was a direct threat at Austria-Hungary, and in support of its ally Germany promptly declared war upon Russia. England agreed to remain out of the conflict on condition that Germany did not seek to humiliate France and that the neutrality of Belgium should be respected.

Turkey felt kindly towards Germany; German officers had long drilled the armies of Turkey, and German influence was stronger in that country than that of any other power. Moreover, Turkey saw an opportunity, with strong assistance, to regain lost territory from its old enemy, Russia.

## *First Weeks of the Conflict*

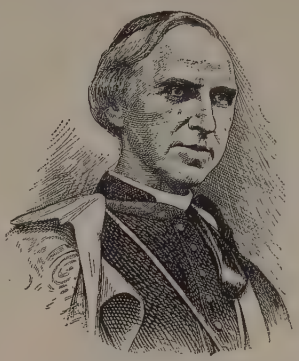
With the beginning of hostilities the world was amazed at the thorough preparedness of the German Empire to strike a mighty blow. From the day the first troops moved it was apparent that the announced cause of the war was to be a negligible factor. The German emperor, in command of the most powerful army the world ever saw, became at once the dominant figure in Europe. As later developed, but not known at the time, it was the purpose of the kaiser to humble France within a period of a month or less, then turn sharply and defeat Russia. With these two powers reduced, it would next turn its attention to England. In the south whatever resistance the Balkan states offered was to be speedily overcome and a clear road opened into Asia (a feat that was accomplished within two years).

As soon as it was seen that war was inevitable France moved 200,000 men to its eastern frontier, where they took positions six miles from the border, below the Belgium and Luxemburg lines. The only objective at which it could strike was Alsace-Lorraine, the most westerly German territory. No one knew where Germany planned to strike, and its powerful blow fell in an unexpected quarter. Dispatches reported miles upon miles of men clad in gray-green, marching west—a constant stream day after day so vast as to be unbelievable. The German chiefs sought from Belgium freedom to pass through the kingdom on the shortest route to France and Paris. The German government promised reparation after the war for any damage which might be inflicted in a peaceful passage.

**Belgium's Position.** Three times had the powers of Europe signed treaties guaranteeing the safety and neutrality of Belgium. In 1815 that country was given to Holland by the Congress of Vienna, from which relation it revolted in 1830 and secured its independence. In 1831 Great Britain, France, Prussia and Russia guaranteed its independence and neutrality. In 1839 Holland finally accepted Belgium's separate existence, and the treaty of 1831 was replaced by another of the same tenor. In 1870, at the outbreak of the Franco-German War, it was feared that Belgium might be forced into the conflict against its will, as its position between the two warring powers exposed it to attack. Great Britain succeeded in negotiating separate treaties with Germany and France by which the British government agreed that if either of the warring powers should violate Belgium neutrality the other would have Britain's help in defense of the treaty of 1839.

**"Necessity," the Plea of Germany.** "Belgium is a nation, not a road," King Albert is declared to have said when his government rejected the German demand for free passage into France; it could not do otherwise without being false to itself and to the spirit and letter of its neutrality. Germany referred to the treaty as "a scrap of paper," and hurled its legions upon Belgian soil. At midnight on the day Germany invaded Belgium, August 4, England declared war on the former country. Only 200,000 soldiers could Belgium oppose to Germany's flood of men, but for two weeks it held back that flood—and those two weeks disrupted every

Teuton plan and lost to the central empires their chance of speedy conclusion of the war. It gave France time to swing its troops across the path of the invader; it afforded opportunity for England to put its little army of 175,000 into Northern France, to stand beside its ally.



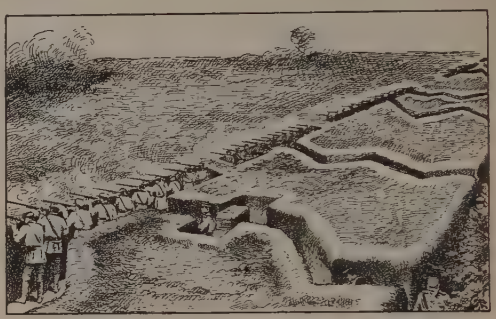
CARDINAL MERCIER

The Belgian churchman who upheld his country's rights against the invaders and thereby won the admiration of the world.

It was on August 2 that the German ultimatum was delivered to Belgium. Bigger guns than the rest of the world knew existed hammered at the forts of Liége, among the most formidable in the world; on the 15th Liége fell. Four days later Brussels was occupied, and the Belgian government moved towards France, where, at Havre, it was finally established. On the 24th Namur was taken; the next day Louvain was sacked and partly destroyed. On to France marched the gray-green hosts, and until September 5 they drove back the French, Belgians and British. At the Marne River the allied armies accomplished what the Belgians alone had begun; in the Battle of the Marne, only forty miles from Paris, Marshal Joffre stayed the flood and saved the capital. On September 8 the Germans began to retreat, and did not stop until they reached the Aisne. At once they inaugurated a new idea in warfare by "digging themselves in"—building trenches in which to protect themselves from the fire of the enemy.

France was saved, though the enemy held practically one-tenth of its richest territory. Thus runs the story of the beginning of the great war.

Now there began the most stupendous endeavor to cope with the fearful situation. Safely behind its Grand Fleet and behind the back of better-prepared France, Britain began the hurried formation of an army to throw across the Channel to the protection of France and of itself. "Kitchener's army," it was called, for "Kitchener of Khartum" was its organizer; within three years 5,000,000 young men of the Empire had joined the colors—the greatest volunteer army the world had ever seen. But even a year after the Battle of the Marne it was ill prepared to take its place by the side of France in the field. Not until 1917 did Britain reach its full strength.



A TRENCH SYSTEM

Before concentration of gunfire destroys trenches, their appearance is everywhere much like the system shown above. It was reported and generally accepted as true that between the North Sea and Switzerland on the west front there existed as early as the autumn of 1915 over 12,000 miles of trench works, on the 450-mile line.

## *The Battle Fronts*

In the early days of the conflict three great battle lines were established. Their lengths told plainly of the magnitude of the tasks of the opposing forces.

**The Western Front.** The line which held the closest attention of the world was the so-called western front; it extended roughly in its northern section along the point to which the Germans retreated after their defeat at the Marne and the points to which other German armies were hurried to oppose the French. This line extended literally 450 miles, from the North Sea to Switzerland, a distance about half as great as from New York to Chicago. Concentrations of men and munitions were greater in some sections than in others, but all along that winding course were established walls of men and of glistening steel. Here and there where the need was greatest 2,000 heavy guns of all sizes on each side roared their challenge to the enemy in every mile. After three years of war no point in the line had been bent as far as twenty miles by either contending force, but over a million men died in the onslaughts and in the shock of resistance.

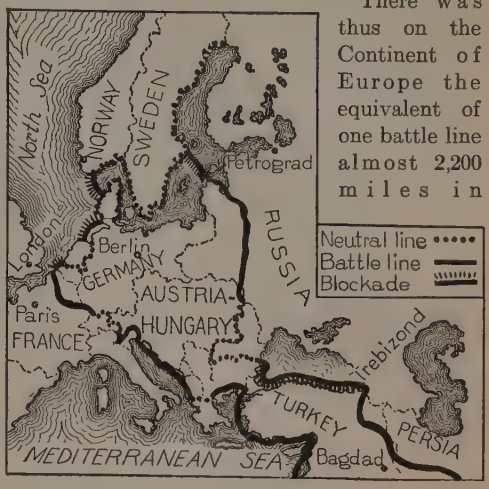
Two high German officers held the eastern side of the line during the greater part of the war—Crown Prince Ruprecht of Bavaria in

the north and the German crown prince, Frederick William, in the south. There were numerous subordinate commands under them. The English commander during the first year was Lord French; he was superseded in 1915 by Field Marshal Haig. Marshal Joffre of France in the third year gave way in the field to General Neville, who in turn was succeeded by General Pétain in chief command. When, in 1917, the United States became a factor on the western front General Pershing commanded the American divisions; from the first England and France reposed great confidence in him.

**The Eastern Front.** Second in interest and first in length was the line which grew rapidly in extent along the eastern boundaries of the central empires, where Teutonic and Russian hosts faced each other. From Riga, on the Baltic Sea, to the shores of the Black Sea, a distance of 1,125 miles, it stretched—not continuously, it is true, but there were few unoccupied portions. For Russia Grand Duke Nicholas commanded for a year and a half; he displeased the czar, who was his cousin, and the latter assumed nominal command. In the north Von Hindenburg brought to German arms their most hopeful victories; so popular did he become that he was raised to the station of chief of the general staff. Farther south Von Ludendorff and Von Mackensen commanded.

**Other Fronts.** With the entry of Italy into the war another front, the most difficult that the world ever saw, was established, from Switzerland along the Italian frontier almost to Trieste. Its length was 320 miles.

Eventually the strategy of war compelled a line to be drawn through the Southern Balkan region by the entente allies, to protect their interests in Greece and to oppose a threatened descent upon the district by the central powers. This line was 300 miles in length; only the main strategic points were garrisoned, but an army of half a million men was required there. There was thus on the Continent of Europe the equivalent of one battle line almost 2,200 miles in length. What this means is made clearer by comparison with a line stretched from Chicago to San Francisco, which would be only a hundred miles longer.




IN THE EARLY PERIOD

The map shows the limit of greatest gains of the central powers, late in 1914, and the iron ring which closed around Germany and its allies.

Other operations, such as the Dardanelles campaign and those in Turkey in Asia, were on a scale which in any former war would have made them major campaigns. Here they were subordinate to the more gigantic phases on the eastern and western fronts, yet they were a vital part of the strategy of the war.

## *Land Operations to the End of 1915*

**In the West.** The account on page 6155 carried the opening operations in 1914 in the west to the retirement of the Germans in a four days' retreat to the banks of the Aisne. This ended September 11. A deadlock then ensued, not to be seriously broken in that particular sector for over two years. The winter of 1914-1915 was utilized by the French and British to assemble manufacturing plants to supply munitions of war, in which they were woefully lacking. Within a year each country was producing more guns and shells every week than was possible in three months in 1914, and only after that lapse of time were they able to meet the foe on anything like an equal basis.

All through that winter artillery thundered from the North Sea to Switzerland. Early in January the French took the offensive in Alsace and captured Steinbach. They also attacked successfully near Soissons, but subsequently lost all they had gained by it. The British attacked farther north and fell but little short of routing the Germans. Their gains were in the direction of Lille; they took Neuve Chapelle, and the enemy never recovered it. The German crown prince made many sorties in the direction of Verdun, on a straight road to Paris, hoping to isolate that city and its fortress, but the French resisted him successfully.

In April, 1915, the Germans began a strong offensive movement to capture Calais, on the English Channel. Had they succeeded they might have controlled that important waterway. By the use of asphyxiating gas, then used for the first time, they gained nearly three miles. Two attacks on Ypres were frustrated, largely by the heroism of Canadian regiments. No further effort to take Calais was made. All through the summer bitter trench fighting continued. All Western Belgium and Northeastern France was a maze of trenches; at one point on a line of twelve miles there were 200 miles of trenches. The French gradually crept towards Lens, the most important coal mining town in France, which was held by the Germans and was daily contributing to their needs. The most important allied gain was the capture of a vast underground fortress of steel and concrete, known as the Labyrinth, which the foe had believed impregnable. It covered an area of over two square miles.

In September a tremendous drive was begun by the British and French in Champagne, Artois and Belgium. The Germans were driven back three miles, but the allies could not break through. At the end of the year, however, it was seen that the titanic effort of the preceding months had wrested fifty square miles of territory from the invaders.

**On the Eastern Front.** The Germans hoped Russia would first attempt operations through

REGION OF THE MAZURIAN LAKES

Poland in the direction of Berlin. They could easily strike from the north and south and isolate Russia's finest army. However, Grand Duke Nicholas himself attacked farther north, in East Prussia, and far to the south, in Galicia. Von Hindenburg defeated the effort in the north, and gained fame in the Mazurian lakes region, but in the south the Slavs were more fortunate. They advanced against the Austrians, took the important city of Lemberg on August 31, 1914, and began a siege of Przemysl, which they captured, March 22, 1915, after an investment of the town for seven months.

Von Hindenburg attacked in Poland and reached within seven miles of Warsaw in October, 1914, when Nicholas turned him back in a reverse so serious that he was unable at once to go to the help of the Austrians in opposing a second invasion of Galicia. The Austrians were slaughtered in the Carpathian snows, and Cracow was threatened. Russia's victorious army followed too far, and Von Mackensen's Germans, by a marvelous feat at arms, nearly annihilated the enemy. Again Von Hindenburg struck in the direction of Warsaw, but was checked by Nicholas, and a deadlock ensued until the middle of 1915.

The Austrians, with fresh troops in vast numbers, tried conclusions again with the Russians in Galicia, and were badly defeated. The latter were able to occupy all the important Carpathian passes, and these they held until June, 1915. At the end of 1914 Germany, and Austria-Hungary were on the defensive along most of the eastern front.

In 1915 disaster befell the Russians, largely because of lack of munitions. It was later known that high officials in the Empire were criminally responsible for this condition. The central powers massed powerful forces all along the line, and gained much territory. Russia was driven out of Galicia; it lost Lemberg; Przemysl was again in Austro-Hungarian hands; Warsaw capitulated to the invaders early in August. In September Vilna was captured and Riga was threatened. Grand Duke Nicholas was relieved of the Russian command and transferred to the Caucasus, where he gave a good account of himself. The czar assumed nominal command on the east front, with General Russky as chief of staff.

Russia's forces fought the Turks successfully during the period covered by the above record, clearing them out of the Caucasus and opening the way for further successes in 1916.

**The Dardanelles Campaign.** Turkey could not spare troops to assist Austria against Russia, for the allies inaugurated a vigorous offensive at the Dardanelles which required all its power to resist. In December, 1914, a great

NARROW GATES TO CONSTANTINOPLE

The allies struck at the Dardanelles and occupied less than one-twentieth of the Gallipoli Peninsula. The campaign was an allied disaster.

fleet of France and Britain attacked the Turkish forts at the entrance from the Mediterranean Sea and in ten weeks captured them. Landing of troops followed, but this was accompanied with heavy losses, both of infantry and of five battleships, the latter sunk by torpedoes. Only until the early days of 1916 did the effort to crumble Turkish opposition continue. On January 9 the last of the allied forces retreated. The failure of the campaign had far-reaching effects; not only did it secure Constantinople in Turkish possession, free from danger of a second attack, but allied prestige was lowered throughout the Balkan countries.

**Serbia Overwhelmed.** Immediately after the declaration of war against Serbia by Austria-Hungary the latter country organized an offensive which should overrun the little country. Belgrade, just across the Danube, on the border, was captured by overwhelming forces on December 2, but two weeks later, in a strong counter-offensive, Serbia regained its capital. Several Austrian commanders were retired in disgrace because of their failure to subdue the Serbs. After this success Serbia's army was attacked by typhus fever, and its fighting power was slight for the next six months. In June, 1915, the central powers moved troops from the eastern front and were joined by Bulgaria, which had entered the war on their side, and the subjugation of Serbia was again attempted.

Not only was it deemed necessary to punish Serbia for the causes which precipitated the war, but it was important to open a direct road through to Constantinople to give aid to the Turks, who were demanding help. Such an open road would make it possible, also, to exert strong pressure upon other Balkan states and influence them against joining the allies. Besides, success in this direction would make possible a campaign against the Suez Canal.

Bulgaria had been persuaded to join the central powers at this juncture, after it had sought promises from the allies which they were loath to entertain. The central powers held before Bulgaria the lure of rich additions of territory which had been lost by the Bulgars in the Balkan Wars. When the Austro-Germans and the Bulgarians moved against Serbia, in August, the latter country, disappointed in the hope of assistance direct from Russia and from England and France from the Grecian front, fought valiantly in defense of its liberties, but unavailingly. By December all of Serbia except the southern border and a narrow strip in the west was in the hands of the conquerors.

MAP OF THE WESTERN FRONT

The Germans penetrated five-sixths of the way to Paris from the frontier, then were driven back to the Aisne River. The lines of operations on the map show almost the exact disposition of forces for the first three years of the war.

## *Events on Land in 1916*

**In the West.** Before the end of the year 1915 the central powers made a bid for peace, based "on the map of Europe." This meant that they should keep what they had taken by the sword. The allies in the early days of the year rejected the German assumption of victory, with the result that during the year the most sanguinary conflicts thus far occurred.

The outstanding event, with which probably no other single occurrence in military history can compare, was the battle for the possession of Verdun, the central gateway to Paris. The German crown prince commanded the army which began the assault. From February 22 until near the close of September the battle raged, with practically no intermission. Had the Germans battered their way through the victory would have added mightily to German prestige, but the effort failed utterly, after costing more than half a million dead and countless others wounded. France suffered very severely in losses of men; indeed, one of the reasons for the persistent effort was to "bleed France white," but at the end the courage of the republic was undaunted, and its hopes bright. The Germans had been able to advance four miles in six months, but they were yet three miles from nearly ruined Verdun when cessation of their attacks acknowledged defeat.

Particularly bitter were the assaults and counter-assaults around such never-to-be-forgotten spots as Fort Douamont, Le Mort Homme (Dead Man's Hill), Haucourt, Bethencourt, Fort Vaux, Hill 304 and Hill 305.

While the attention of the world was centered on Verdun the allies were preparing a great offensive farther north, along the Somme. It began in July, and proved to be a disaster for German arms. The allies by this time could meet the enemy on even terms with respect to artillery, and with their great guns they destroyed miles of trench works of steel and concrete, on which months of effort had been spent. The British alone fired more than 500,000 shells a day, along a front of twenty-five miles. Day after day until December, the allies pushed the Germans back; they captured the ruined sites of village after village, penetrated second and third line trenches, and took elevated positions which gave their artillery more certain range. The Germans fought as stubbornly; sometimes counter-attacks regained ground, only to be lost again later. The campaign was so disastrous to the Germans that Von Hindenburg moved his whole forces back to the famous Hindenburg line—but this did not occur until early in 1917.

In this year (1916), from April 24 to May 1, occurred a revolt in Ireland which threatened to result seriously. Sir Roger Casement, who had held important British posts of honor, was captured while endeavoring to smuggle German arms into Ireland. He was tried by court-martial, and shot; six other leaders in the insurrection also suffered the death penalty, and what had at first appeared a very dangerous situation ended ingloriously. Rioting in Dublin destroyed much government property.

**In the East.** Russia had taken advantage of the winter months to organize more thoroughly and to acquire vast quantities of munitions. In June the czar's armies began an offensive on a large scale near the southern end of their 1,100-mile battle line. The Austrians could not resist the onslaught, and before winter Russia had overrun the crownland of Bukowina, and it again threatened Lemberg. The Austrians were driven again into the Carpathian Mountains.

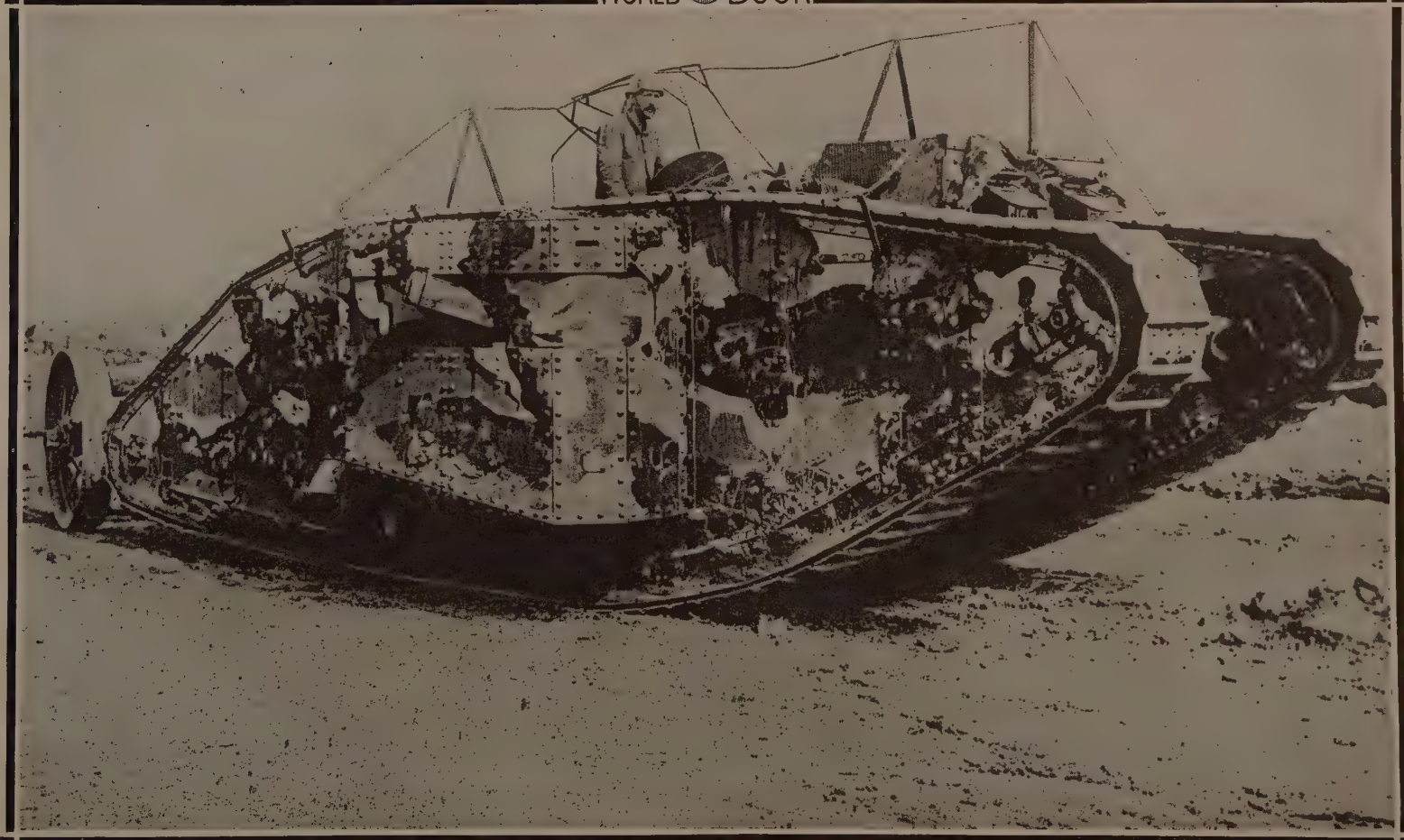
**On the Italian Front.** In May Italy was ready to take the field against Austria-Hungary. For two months small engagements occurred on many parts of the whole 320-mile front; in August remarkable headway was made by Italy along the Isonzo River and plateau. The culmination of the year's work was the capture of Goritz. Before winter stopped operations plans were under way to attack Trieste, the Austrian Adriatic port.

**Rumania Crushed.** Rumania elected to join the allies. In addressing the world on its decision it complained that the safety of the country was threatened by Austria-Hungary.

Immediately after its declaration of war its armies invaded Transylvania with success. The passes in the Carpathians were seized and strengthened. Austria-Hungary was not in position at the time to retaliate, owing to its severe defeats at the hands of the Russians. The punishment of Rumania was therefore assigned to Germany and Bulgaria. Under Von Mackensen and Von Falkenhayn, their armies swept straight through to the Black Sea. They captured Bucharest, and about half of the country, with rich resources in foodstuffs, fell into the hands of the conquerors.

**On Other Fronts.** Earlier in this record it was stated that on January 9, 1916, the Galli-

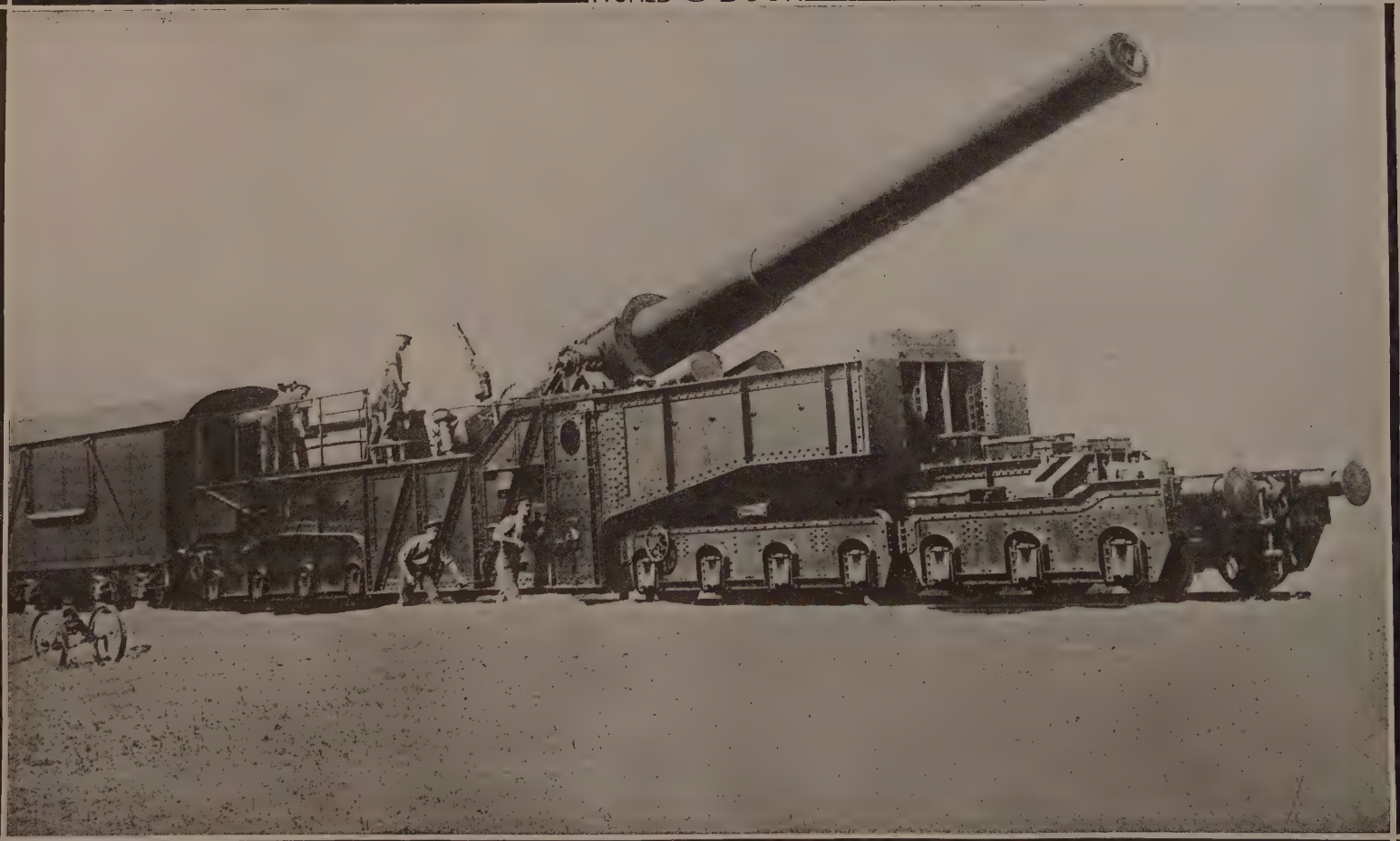
Official British War Photograph.



**ONE OF THE BRITISH "TANKS."**

This one is *camouflaged*—painted in colors of its surroundings—so it is practically invisible at a short distance. Over 200 of these helped in the attack on Cambrai, in December, 1917.

Official British War Photograph.



A BRITISH MONSTER OF STEEL.

Such guns as the above can be moved only on railway trucks. They pound the German lines from a distance of a dozen miles.

poli peninsula was abandoned by the allies. This disaster was the more distressing to contemplate after it was learned that had they persisted in their efforts a few more days they would have won their objective, for Turkey was at the point of abandoning the defense.

In Armenia Grand Duke Nicholas conducted a successful Russian campaign. His most notable deeds were the capture of Erzerum, Trebizond, Erzingan and Baiburt. Turkey made a number of attempts to cross the Syrian Desert and strike at the Suez Canal. The difficulties encountered were too great; some troops reached the canal, but the British drove them back. It was of vital importance to the latter to protect this waterway.

The situation in Greece caused grave concern on both sides, but no climax was reached. Serbian forces, driven out of their home land, took refuge on Grecian islands for reorganization, and then were transferred to Saloniki, which the allies occupied. The king of Greece, brother-in-law of the German kaiser, maintained a questionable neutrality, but the Venizelos faction, favorable to the allies, joined in fighting against Bulgaria. Greece had been bound by treaty to go to the relief of Serbia whenever that country should be attacked, but at the vital moment in 1915 had refused to do so. The allies therefore put little faith in King Constantine, and as a precautionary measure blockaded the Greek coast. Royalist troops attacked allied forces in November; this clash was the result of attempts to secure arms and ammunition which the government had agreed to turn over to the allies; the latter had demanded this as a precautionary measure. The transfer was later made, though not until Constantine was threatened with dethronement.

MAP OF THE EASTERN FRONT

For two years territory near the solid lines and the crossed lines was taken by Germany from Russia, then regained by the latter and in many cases lost again. The heavy line crossing and recrossing the line of Germany's farthest eastern drive represents the positions of German armies during the first half of 1917.

## *Events on Land in 1917*

In the beginning of the year the allied nations saw much in the general situation to encourage them. On the western front in the latter part of 1916 their preponderance of war material had told heavily against the central powers. Italy had whipped Austria-Hungary in every encounter during the past year, and the latter country was in a deplorable condition. There were many who believed the war would come to an end in 1917. This feeling was increased by the entrance of the United States into the conflict in April, though in official circles the optimism was not so generally shared. The attitude of popular satisfaction outside of the central empires was quickly changed when Russia deserted the allies; and in October reverses in the Italian section further endangered the cause and gave the central powers renewed courage.

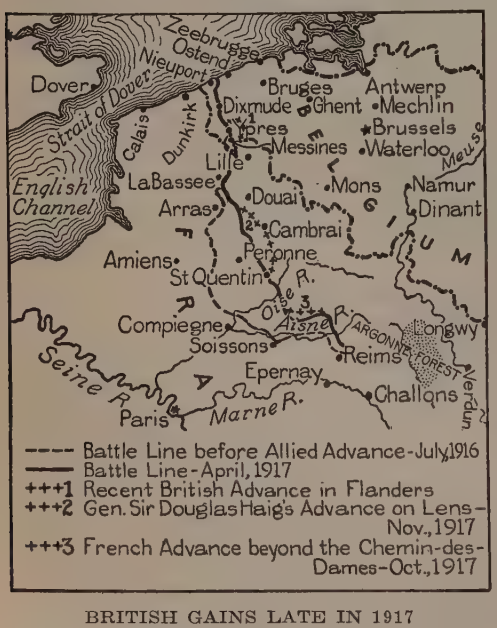
During the year the most notable effort towards peace that had been made was set in motion by Pope Benedict. He sent a note on August 1 to each of the warring powers, suggesting compromises which might end the struggle. The spokesman for the allies, in reply, was President Wilson, who made it clear that they could not conclude peace with a government they could not trust. That part of the reply which referred to the main issue is as follows:

The object of this war is to deliver the free peoples of the world from the menace and the actual power of a vast military establishment controlled by an irresponsible government which, having secretly planned to dominate the world, proceeded to carry the plan out without regard either to the sacred obligations of treaty or the long-established practices and long-cherished

principles of international action and honor; which chose its own time for the war; delivered its blow fiercely and suddenly; stopped at no barrier either of law or of mercy; swept a whole continent within the tide of blood—not the blood of soldiers only but the blood of innocent women and children; also of the helpless poor; and now stands balked but not defeated, the enemy of four-fifths of the world.

**In the West.** The Battle of Verdun practically ended in September, 1916, but each side resolutely held its ground, and each sought for weak points at which to thrust. Nothing vital was accomplished by either side until August, when the French attacked on both sides of the Meuse and took territory along a front of eleven miles; they won back in three days what the crown prince's army had taken from them in the great six-months' battle the year before. On December 1 the battle still raged, with daily assaults and counterattacks, but the French tenaciously held all the gains that they had made.

The most important military operations in the west during the year were in the northeast corner of France and in Belgium. The British,




BRITISH GAINS LATE IN 1917

The most spectacular advance was that of General Byng, in section marked 2, under the chief command of Field Marshal Haig.

Canadians, French and Belgians joined in offensives which threatened to destroy the German morale in that section. In June the British exploded a series of mines on a ten-mile front in Messines, Belgium, the most gigantic operation of the kind ever known; this feat and the operations which followed during the next few days drove the Germans back on a five-mile front to the depth of three miles.

A little to the south a vast movement towards Lens was largely in charge of the Canadians. Little by little they fought their way into the outskirts of the coal city, and so dominated the situation that the value of Lens as a producer for the enemy was destroyed.

Late in November British Major-General Byng planned and executed a surprise attack against Cambrai. Over a front of thirty miles the Germans under Crown Prince Rupprecht were pushed back more than five miles; positions deemed impregnable were taken from them, and they were driven to a desperate defense of Cambrai, with the British only two miles distant. That town had been for three years a very important German base. Its six railroads penetrated Germany and extended to the North Sea. A very important element in Byng's attack was the vital assistance rendered by scores of armored cars, called "tanks," which no power of the enemy, except their heavy guns within close range, could destroy. They advanced over all obstacles—barbed wire, stone fences, small trees and the like—and passed over great shell holes and trenches with ease.

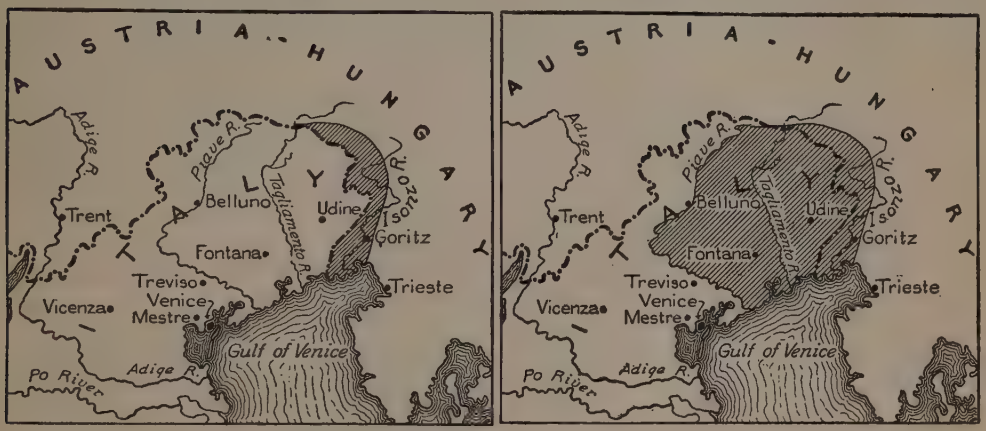
**Russia's Catastrophe.** On March 15, before the spring campaign in the east could be undertaken, the Russians overthrew their government, imprisoned the czar in his palace and declared to the world that Russia was free. They took this course because of intrigue at the royal palace and throughout the czar's retinue which threatened an early peace with Germany and treachery to the allies. The world outside of the central empires hailed Russia's emancipation with joy; the allies, particularly, were pleased, inasmuch as the czar's desire for peace was known and the revolutionists had at once announced that the war would continue in conjunction with the allies. The Russian armies drove the Austrians back in Galicia and threatened them in Poland; then almost in a day it was seen that liberty was too new a possession, and that the Russians were intoxicated with it. The provisional government, under Kerensky, a brilliant Socialist (see page 5122), fought desperately to control the rising tide of anarchy which threatened to engulf both the military and civil establishments. German influence, wherever it could get a foothold, seemed as insidious as when the czar ruled. Fighting men laid down their arms in

scores of brigades; in one section of the long front when the Germans attacked the Russians opened the way for their advance.

In September, after futile efforts to secure a separate peace, a German army and over half of its navy made a demonstration in the direction of the Gulf of Finland. On the way they captured Riga, a great seaport, without meeting resistance. Pressing onward, they took Oesel and Dago islands, commanding the gulf, but only after considerable resistance had been overcome. In a naval engagement, against heavier units, the Russians inflicted severe damage, sinking a total of a dozen vessels, losing one battleship and three destroyers of their own; but the way to the forts at Kronstadt and to the capital city, Petrograd, was open.

reporter on a New York Jewish paper at a salary of $12 per week. Trotzky was made foreign minister of Russia, and Lenine, as premier, was given autocratic power by the workingmen's and soldiers' committee. The announced program of this revolutionary government was to obtain peace with the Germanic powers and to confiscate all land in Russia and parcel it out to the peasants. The leaders called themselves and their ignorant followers the *bolsheviki,* or *maximalists,* a term which finds its nearest American interpretation in *those of the majority,* or *common people.*

On December 9 the bolsheviki arranged an armistice with Germany and entered into peace negotiations on the basis of "no indemnities and no annexations." The Germans rejected




GERMAN OCCUPATION OF ITALY

At the left the shaded area represents the extent of the Italian invasion of Austrian territory. At right, the shaded section shows the same territory regained for Austria by the armies of Germany, and roughly the depth of the Austro-German drive in November, 1917, towards Venice.

However, there was another surprise in the Russian situation. A so-called council of workingmen and soldiers, after secret organization, overthrew the provincial government in November and seized all power. Those members of the late government who were unable to escape were arrested, and in a brief reign of terror which resulted while the new forces were gaining control in Petrograd and Moscow between 8,000 and 10,000 people in the two cities were killed. Kerensky was able to escape.

The leaders in the *coup* were Nicolai Lenine and Leon Trotzky. Lenine had been proclaimed a German emissary in July by the provisional government, and at the crisis of his revolutionary movement he was surrounded by German officers as his advisers. Trotzky was a Russian who had returned from America after the March revolution. He had been a

such terms and demanded for themselves all occupied territory. Trotzky and his associates refused to make peace, but also declared they would not continue the war. In March, 1918, Lenine signed a humiliating peace by which Germany was given Livonia, Esthonia, Courland and the Aland Islands, and its title to Poland was confirmed. German armies, however, contemptuously disregarding the treaty, continued their march into Russian territory and before June had control also of the Ukraine and of Crimea. Germany's influence, too, was paramount in the new republic of Finland.

**Italian Reverses.** Italy's campaign against Austria-Hungary progressed steadily throughout the summer and early fall, under the leadership of Cadorna. The army's outposts were pushed far northward over mountains which made its successful movements the marvel of

the entire war. Goritz, an important city, was the center of an extensive territory taken from Austria, and Italian lines reached within ten miles of the fine seaport, Trieste.

At this critical juncture, when Austria-Hungary was despairing of the present and dreading the future, Germany was urged to come to its assistance. The desperate situation was recognized, and several army corps and many large guns were quickly transferred from the paralyzed Russian front. With this formidable reënforcement, and by intrigue which undermined Italian morale, the Austro-German attack which followed won from Italy in three days 1,000 square miles of territory—more than it had gained in several months of courageous fighting. Italy vainly tried to check the invasion at the Tagliamento River, but failed, and its armies retreated slowly to the Piave River, where they chose to stand and face the powerful foe. Italian bravery, and the mountain territory, halted the Germans.

Alarmed at the development, England and France hastened to give aid to their ally before the enemy, by using overwhelming numbers of troops, should dispose of the Italian armies and threaten disaster to the allied cause. Before December heavy reënforcements arrived from the western front, and the foe was halted.

**The War in Asia.** A British expeditionary force appeared near the end of 1915 north of the Persian Gulf. Its objective was Bagdad, the most important point on the new Euphrates Valley, or Bagdad, Railway. In November it successfully attacked the Turks south of Bagdad; in December it was defeated by them and driven into Kut-el-Amara, where it was surrounded and besieged. On April 29, 1916, because of threatened starvation, the entire force of 10,000 men and officers surrendered. This was a severe blow to British prestige, but another force, which had attempted to relieve the first, succeeded in the next year in capturing Bagdad and penetrating north of the city.

THE WAR IN ASIA

After the surrender of an English force at Kut-el-Amara another British force captured Bagdad and made its way towards Jerusalem.

With characteristic British determination the army of England in Asia continued its task of lessening the territory and the influence of the central powers in the realm of the sultan. By December 1, 1917, it had fought its way to within three miles of Jerusalem, and on the 10th it captured that "cradle of the Christian world."

**The Greek King Abdicates.** The situation in Greece remained tense and critical during the first half of 1917. On the 12th of June King Constantine, no longer trusted by the allies, was forced to abdicate, and the throne was given to his second son Alexander, for at least the period of the war. Alexander favored the allied cause; he recalled Venizelos to power as Prime Minister, and thereafter Greece was considered an addition to the allied nations. Former King Constantine went to Switzerland.

## *Events on Land in 1918*

After a winter without operations on a major scale the Germans announced an offensive campaign which by weight of numbers of men and guns should crush the enemy on the western front. The objects to be attained were to separate the French and British armies, then to attack the British and completely destroy their effectiveness, after which the French were to be forced to abandon the struggle. Field Marshal Hindenburg promised the German people that he would be in Paris by April 1.

**Germany's Great Offensive.** The great attack began on March 21, 1918, on a front of fifty-one miles, extending from Ypres southward. Such pressure was never before exerted by an attacking force in all the history of the world, and never before was the loss of human life so great. In the first twenty-four hours the Germans reported officially that they used more high-explosive shells than were employed in the entire Franco-German War of 1870-1871. The allied armies could not stand against such storms of death and pressure of advancing foes, and they slowly retreated for ten days, fighting tenaciously and inflicting tremendous losses upon the enemy; their own losses were heavy.

By April 1 the onrush had been stopped by the desperate valor of the defenders. This result was due in no small degree to the unification of the allied command under the French General Foch (which see). Heretofore each allied army had fought independently, but the unity secured during the dark days of this successful German advance made it possible to use needed troops, regardless of nationality, in any sorely-pressed spot.

The German armies had taken French territory to a depth of about twenty-seven miles in ten days. So rapid had been their advance that they were forced to suspend operations to reform their lines and advance slower units, such as heavy artillery. A week later the offensive was started again, but the allies held the advancing hosts more quickly than before, for the second drive was slowed up in seven days, and only about fifteen miles more were gained. Other drives followed, until six had spent themselves. Then ensued a brief period of comparative quiet, during which the entire resources of the central powers were concentrated largely upon the center of the western front, in preparation for an assault which should carry the Germans into Paris. Scattered fighting of desperate character continued, however.

**The Battle for Paris.** On May 27 the battle was resumed with unprecedented intensity. The most active section was the line from the Chemin des Dames, northeast of Soissons, westward through Noyon to Cantigny and northward to Arras. The weight of German steel and preponderance of man power drove the British, French and Americans steadily back, though they fought with stubbornness which was steadily exhausting the attackers. The great drive also extended eastward towards Rheims; and, too, another offensive was launched against the British, Belgians and Americans in the region of Ypres, in an effort to reach the Channel ports.

The outlook for the entente armies was truly discouraging. Field Marshal Haig sent out the cry, "We are fighting with our backs to the wall!" While there was some encouragement in the old saying, "The English soldier can fight as long as any other soldier—and fifteen minutes longer," military circles were nevertheless considering new defensive tactics to be employed in case the enemy should break through and reach its objectives. Entente newspapers were preparing their readers for such a catastrophe.

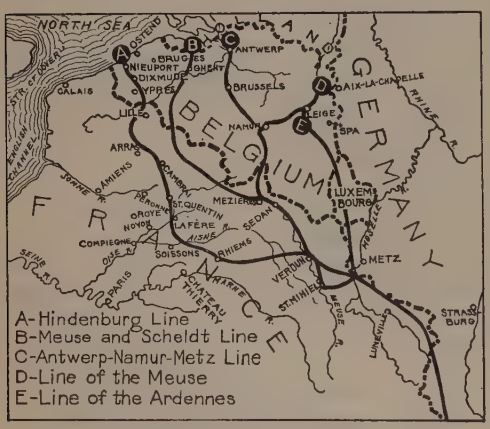
The victorious Germans turned their best battalions in the direction of Paris. Between Soissons and Rheims they advanced in a southwesterly direction, against the French and Americans. From the Soissons-Rheims line they pushed southward to the banks of the Marne, which they reached May 31. At Belleau Wood in a hazardous enterprise 8,000 American marines were reduced to 2,000 effectives, but they won, and grateful France renamed the spot the "Wood of the American Marines." At Château Thierry Americans were sent to relieve tired French men, with instructions to retard the progress of the enemy and fall back slowly to prepared defenses farther in the rear. The Germans, sure of an early entry into Paris, thirty-one miles away, savagely attacked the Americans, and pushed them back. Contrary to expectations, the American general ordered a counter-attack, which was immediately and successfully delivered. Château Thierry was cleared of the Germans on July 21; Paris was saved, and thereafter the Teutonic forces were on the defensive. The steady increase of American effectives gave Foch, who had been raised to the rank of Marshal of France, a numerical superiority which made it possible for him to attack when and where he pleased. The initiative had passed forever from the Germans.

The Soissons-Rheims "pocket," with Château Thierry at its southern tip, on the Marne, was cleared by successive stages. Then began a series of hammering blows by Foch between Rheims and the North Sea. While the entire line of over 200 miles was virtually one great battle, there were distinct and savage encounters in chosen spots, and at times five great battles were raging at one time. Cantigny, northwest of Montdidier, was the scene of a great offensive by American troops, and its capture was followed by thrusts north and south by the British and French. The German line began to recede. By August 18 the allied lines ran south by east of Albert to Soissons, and north from Albert to a line east of Arras, west of Lens and Lille and east of Ypres. The allied world gazed at the map intently day by day and saw, from north to south, the hard-hitting allied line run roughly through Albert, Bray, Rosieres, Montdidier; then through Bapaume, Chaulnes, Roye, Lassigny; Peronne, Nesle, Noyon; Roisel, Ham, Chauny; Lille, Lens, Douai, Cambria, Bohain, Saint Quentin, La Frer, Saint Gobain Forest (from which a supergun had bombarded Paris, seventy-six

miles to the southwest, Laon and Craonne. There were no reverses as the forces of the allies cleared Northern France of the foe.

Meantime, British, Belgian and Americans, operating near the North Sea, exerted such continued pressure upon the foe that mile by mile Belgian soil was reclaimed. Ostend was entered October 17, and on the same day Bruges was occupied. The next day Zeebrugge, which the Germans had made a great submarine base, was cleared of the enemy. Foreseeing disaster in that section, at least, the German high command announced that before November 15 the city of Brussels would be evacuated.

**The Last Days.** By August the Americans were holding thirty-nine miles of the French front. They were destined to play a most important part in the closing days of the war, for Marshal Foch assigned to Pershing's men a difficult and hazardous undertaking as part of the allied offensive from the North Sea to Switzerland. Great success had been achieved by pushing ahead on the ends of short salients and getting the Germans into small "pockets," from which hurried retreat was necessary to avoid surrender. These tactics were now to be employed on a grand scale.




GERMANY'S GREAT DEFENSIVE FRONT

The "Hindenburg line" was smashed by the allies in September, 1918. The Germans were known to have four other strong defensive lines to which they could retreat, if necessary. This knowledge made it evident to the allied commanders that not before 1919 could Germany be conquered, for it was not believed that the enemy would surrender unconditionally before the retiring movement reached German soil. However, Foch's hammering crumpled the vast war machine before the second line (B) was destroyed.

In the north the enveloping campaign was extending into Belgium; the Germans were being driven south and east; they were given no rest in the center, and the Americans were ordered to push northward from the southern end of the battle line.

*The Drive Towards Metz.* On September 12 over 700,000 Americans attacked the Germans at Saint Mihiel, at the western tip of a salient that had existed for over three years and was a constant menace to Verdun. French units were on the flanks. In two days the enemy had been pushed back from this triangular area, and the fighting line ran almost directly southeast from Verdun to within two miles of the Lorraine border. Then began a gruelling campaign north of Verdun, in the region of the Argonne Forest and along the Meuse River. The spectacular features of the struggle farther to the northwest were lacking, but there was no question as to the importance of the operations. For six weeks the desperate defense of the Germans testified to vital facts. If the allied advance could not be checked the Briey coal fields, which had supplied the Germans for three years, would have to be given up; exit from France, in case of necessity, through the Metz gateway would be blocked, and the only great avenue into German for the masses of troops and war material would be along the Meuse valley by way of Namur and Liege.

Here, as on every other fighting front, there was uninterrupted success for entente arms. By October 15 great naval guns of the United States, mounted on railroad cars, were throwing shells upon the formidable forts surrounding Metz, which were only twelve miles distant.

*Germany's Rapid Collapse.* The armies of the kaiser had been in continuous retreat since July, but rear guards, protecting the departing hosts, fought with as great stubbornness as at any previous stage of the war. When Valenciennes was taken the fortresses at Maubeuge was threatened; this was a few miles from the Belgian frontier, and was the last German stronghold on French soil. The German retirement was more and more assuming the aspects of a rout.

News of the exact state of affairs was reaching beyond the Rhine, and the German people began to understand that they had been systematically deceived. Bulgaria had surrendered, Austria-Hungary had quit the alliance, Turkey had given up, and Germany stood alone. President Wilson had nearly a year before specified fourteen points which were declared to be fundamental in any peace discussion. One of these was that in Germany there should be a government in which the allies could repose confidence.

The emperor placed Prince Maximilian of Bavaria in the post of Chancellor of the Empire and assigned to him the task of seeking a cessation of hostilities for discussion of a possible peace. Socialists were admitted to the Ministry; within a few days they dominated the government, and President Wilson was informed that a government of the people was ready to discuss peace. The President, in reply, advised Germany that terms of an armistice could be had upon application to the high

THE ARMISTICE MAP

By terms of the armistice Germany's army was ordered to evacuate Alsace and Lorraine and all of the German Empire west of the Rhine. Moreover, evacuation was to extend twenty miles eastward from the Rhine; the eastern strip thus cleared was to become a neutral zone, in which neither allied nor German troops were to be massed, except for an area encircling the strategic cities of Cologne, Coblenz and Mayence. The shaded area on the map shows the extent of allied occupation of German and former German territory. The black area is the part of France held by Germany on the day of the surrender; its northern and southern extensions show the final battle line.

allied military command, in the person of Marshal Foch. The emperor left Berlin and sought refuge with his army, but it was a poor staff on which to lean. The chancellor demanded the kaiser's abdication; Von Hindenburg declared also that such an act was indispensable, and William II bowed to the inevitable. In the early morning of November 10 the last of the autocrats entered Holland to seek asylum and safety even from his own soldiers.

In the meantime the German government had been informed of the demands of the proposed armistice through representatives who had been escorted through the French lines to the headquarters of Foch. Seventy-two hours was the time limit for acceptance, and this limit was to expire on Monday, November 11, at 5:00 A. M. Capitulation followed within the last hours; 11:00 A. M., November 11, was set as the hour when hostilities should cease.

**The End.** The terms of the armistice forced upon the defeated nation were to be complied with within thirty days. The stipulations were as follows:

Evacuation within fourteen days of Belgium, France, Alsace-Lorraine and Luxemburg.

Surrender of 5,000 guns, half field and half artillery; 25,000 machine guns; 3,000 flame throwers, and 1,500 airplanes.

Surrender of 5,000 locomotives, 150,000 cars, 50,000 wagons and 10,000 motor lorries.

Surrender of railways of Alsace-Lorraine and stores of coal and iron there.

Immediate return of allied prisoners, but German prisoners not to be returned.

Evacuation of west bank of the Rhine, the allies to hold the crossing of the river at Coblentz, Cologne and Mayence for a twenty-mile radius.

The east bank of the Rhine to become a neutral zone and to be evacuated in nineteen days.

German troops to retire at once from any occupied territory which before the war belonged to Russia, Rumania and Turkey.

The allied force to have access to this evacuated territory.

Abrogation of Brest-Litovsk and Rumanian treaties.

Evacuation of all German forces in East Africa within one month.

Surrender of all German submarines.

Surrender of seventy-four warships, including fifty destroyers, ten battle-ships, six battle cruisers and eight light cruisers.

Restitution for damage done by German armies in invaded territories.

Return of cash taken from the national bank of Belgium.

Return of gold taken from Russia and Rumania.

**Collapse on Other Fronts.** No great stress was laid upon an allied advance in the Southwestern Balkan area in September, yet within one month Serbia was cleared almost to the Bulgarian frontier. The armies of Bulgaria accepted an armistice which amounted to unconditional surrender.

The way was now open to a direct attack upon Austria-Hungary from the south; the latter country appealed in vain for German aid, which could not be sent, for Germany was in sore distress on the vital western front. Therefore the Austro-Hungarian alliance with Germany ended on November 3, after Italy had driven the enemy beyond the line of its coveted strip of Austrian territory—the Trentino. The Austrian surrender was complete and humiliating.

Meantime, Allenby's British army in Asia Minor had defeated the Turks, and their communication with Germany and Austria-Hungary having been cut, Turkish surrender was inevitable. It occurred on October 31.

**Loss of Man Power.** A few days after hostilities ceased, the principal powers engaged announced their casualties, subject to later corrections.

*Great Britain:* Total losses, 3,049,932. Of these, nearly 800,000 were known to be dead; the wounded numbered over 2,000,000. There were 359,145 missing, including prisoners in enemy hands and unknown dead.

*France:* Total losses, 2,719,652. Of these, 559,612 were known dead, including 32,769 officers; the wounded numbered 1,833,345, including 83,142 officers. There were 326,695 missing, including prisoners in enemy hands and unknown dead.

*United States:* Total losses, reported on December 1, 1918, but admittedly not complete, were somewhat in excess of 250,000. Of these about 58,478 were killed, and 14,565 had fallen into German hands as prisoners or were otherwise missing. The remainder were on the list of wounded, and of these somewhat over half were not permanently disabled.

**The Valor of America's Soldiers.** In preceding pages there is given an outline of the terrific struggles which were fought out on the battlefields of Europe. The American forces reached a state of training at a time when the allied chances of victory were waning. Indeed, it is recorded that an allied commander in welcoming the American forces said to high officers, "Gentlemen, I am afraid you are too late for the party."

The speed with which the Americans were prepared for the battle line was, next to the incredible quickness in getting 2,000,000 of them to Europe, extremely gratifying. In the last three months of the war the Americans were holding thirty-nine miles of battle front, and were conducting an offensive which was one of the most important of the war.

History will record that the allies expected Germany early in the summer of 1918 to break through to the channel ports and to capture Paris. The coming of the Americans in such unexpected numbers changed every aspect of the war, and when an American contingent definitely stopped the German onrush at Château Thierry, which had not been checked since the offensive began on March 21, the war entered upon its last stage. The Americans maintained the best fighting tradition of the nation; their exploits at Cantigny, Belleau Wood (renamed "Wood of the American Marines"), Château Thierry, Soissons, Saint Mihiel, the Argonne Forest and other scarcely less memorable fields, as well as the service they rendered east of Albert and Amiens and farther north in Flanders, will stand as an imperishable record of their valor. Their participation in the war over 3,000 miles from home, and the cause they championed made them as true crusaders as any of the marching hosts of medieval days. Had the American nation not given itself in sacrificial spirit to the great cause, the force of militarism would have triumphed; the sword of the German kaiser would have dominated the world. The allied nations make these frank admissions.

**The Peace Conference.** The allied council decided that Versailles and Paris should be the locations of the conference which should impose final peace terms. It was determined that the treaty should be signed in the room in Versailles in which Bismarck in 1871 forced the humiliating Prussian peace upon France at the close of the Franco-German war.

From the United States there were five conference delegates. President Wilson named himself as the head of the American delegation; the other members were Secretary of State Lansing; Edward M. House, confidant of President Wilson; Henry White, former ambassador to Italy and France; General Tasker H. Bliss, American military adviser of the supreme war council, who had been in Paris for a year. President Wilson established a precedent which aroused much comment when he departed for Europe December 4, to be absent six weeks from his post in Washington, but it was understood that the allied nations desired his presence. It was announced that upon his return Secretary of War Baker would take his place at the conference.

*The Work of the Conference.* The defeat of the enemy was so overwhelming that whatever terms the allies deemed it proper to impose would have to be accepted by the central powers. The task which gave the allied nations deepest concern was the possibility of disagreement among themselves as to the terms to be imposed. There were five great principles upon which the victors would have to reach conclusions; these related to the following:

1. Secret diplomacy. Should the meetings of the conference be held behind closed doors, or should their full proceedings be published?
2. The question of a league of nations for the future.
3. The reduction of armaments in all countries.
4. The rather vague question of "freedom of the seas."
5. The question of economic equality among nations. This relates to freedom of trade and

breaking down the barriers imposed by high protective tariffs.

The above may be called the greater questions growing out of the war. They are of first importance, but those relating to vital national settlements were fully as delicate; if not decided to the satisfaction of the majority of those affected there might be possibilities of future wars. These so-called minor points were unofficially listed by statesmen as follows:

1. Alsace-Lorraine. These provinces were conceded to France, but there are German interests involved.
2. Permanent disposition of the territory on the west bank of the Rhine.
3. Shall Belgium annex additional territory?
4. What shall be done with the German colonies?
5. Should Germany be allowed to retain the naval base of Helgoland?
6. Decision as to the new Italian frontier from Trent to Trieste, and the counter claims of the Jugo-Slavs.
7. Shall Italy annex various ports on the eastern coast of the Adriatic Sea?
8. What shall be done with Albania?
9. Shall the Germans in Northern Austria be permitted to unite with the reorganized German state?
10. What shall be the boundaries of the new independent Poland?
11. What shall be the boundaries of the Balkan states and of the new small states organized in that part of Europe immediately after the war?
12. Shall these small states with their conflicting interests be permitted to remain independent or be encouraged to join in one or more fairly-strong federations?
13. What shall be done with Schleswig?
14. Should Turkey be driven entirely out of Europe? If so, who shall control Constantinople?
15. What shall be the future status of Palestine, Syria, Lebanon, Armenia and Mesopotamia?
16. Shall Japan be permitted to annex new territory?
17. What restorations and indemnities shall be exacted from the defeated central powers, and under what conditions?
18. Shall Russia work out its own salvation?
19. What shall be the attitude of the victors in case bolshevism brings chaos in Germany and thus threatens the stability of all Europe?
20. What punishment shall be meted out to the kaiser, the crown prince, the king of Bulgaria and hundreds of officers in high command who ordered unspeakable atrocities upon helpless civilian populations?

## *War on the Sea*

In July, 1914, just before the war began, the English fleet was massed in a grand review in the English Channel. A total of 215 ships was in line—the greatest number of fighting vessels ever assembled. Fortunately, this fleet did not at once break up and repair to various stations, so when war was imminent it was ready for instant and powerful action. It promptly occupied stations which prevented Germany from sending its fleet upon the seas, and almost in a single day drove German commerce from the earth. That an effort of this kind should have succeeded and was accomplished so quickly greatly alarmed the German nation, which had placed strong hopes upon the work its navy should perform. What that part would have been can be guessed from the activity of its few vessels on the ocean at the time war was declared. On one supreme occasion, the Battle of Jutland, there was an effort to release the fleet from the encircling guns of Britain, but it failed. Therefore it may be said that from the first day of the war the great German navy, on which the kaiser had lavished millions of dollars and which was his especial pride, was virtually bottled up within the Kiel Canal and behind the vast mine fields of Helgoland and the great guns of Cuxhaven and Wilhelmshaven, as useless as though it had never existed. But Germany found another way to make its power felt upon the seas.

A few German torpedo boats and cruisers which were at sea preyed upon North Sea commerce at once after the declaration of war; submarine boats torpedoed British cruisers, sinking three in one day, with a loss of over 1,100 lives. Gradually these enemy vessels, including some of the elusive submarines, were captured or sunk. After a few months only the submarines were feared in the waters near Europe.

Three German cruisers engaged a British naval unit off the coast of Chile November 1, 1914, and sank two cruisers and disabled two others. The score was squared on December 8, when another British squadron engaged these German vessels off the Falkland Islands. The *Dresden* alone escaped destruction. The German cruiser *Emden* for a time roamed the oceans without challenge. It destroyed shipping valued close to $10,000,000 and sank a French and a Russian cruiser. In the second week in November an Australian war vessel sank it.

During 1916 several German commerce raiders were successful on all the seas. The *Dresden, Prinz Eitel Friedrich, Karlshrue, Kronprinz Wilhelm* and *Koenigsburg* deserve spe-

cial mention. The *Dresden* was destroyed by the British at Juan Fernandez Island on March 15, 1915; the *Karlshrue,* in East African waters, July 11. The *Prinz Eitel Friedrich* and the *Kronprinz Wilhelm* took refuge at Newport News, Virginia, in April, and were interned. The *Goeben* and the *Breslau* bombarded African ports on the Mediterranean, then escaped through the Dardanelles into Turkish waters.

The great naval engagement of the war and the most notable naval battle in the history of the world as regards number and weight of vessels and power of guns—was fought in an arm of the Baltic Sea on May 31, 1916. Historians very generally have agreed in calling it the Battle of Jutland.

Into open sea the German Grand Fleet sailed to invite battle, and was met by a strong contingent of Britain's battle cruisers. Nearly all day the contest continued, the vessels of the two forces fighting at a distance of about eight to ten miles. Towards evening the dreadnaughts of the British fleet, which had been called over a hundred miles by wireless, arrived and joined the battle line. The Germans withdrew behind their mine fields. The latter were first to give a version of the battle to the world, and they announced a German victory. However, the British were yet masters of the sea, and at the conclusion of the war the truth was told. A captain of the German navy admitted that the German claim was mere boasting; that in the Jutland battle the fleet was saved from destruction only by good leadership and favorable hazy weather. Had the atmosphere been clear and the leadership less able the destruction of the whole German navy would have been inevitable. As it was, the losses were so great that every naval man knew that Jutland must be the sole naval engagement of the war. The British admitted the loss of fourteen vessels, aggregating 114,100 tons, and 5,613 men. The Germans conceded the loss of eleven ships, of 63,015 tons, and 3,966 men. The British statement has been verified; Germany's actual loss is not yet known to the world.

## *The War in the Air*

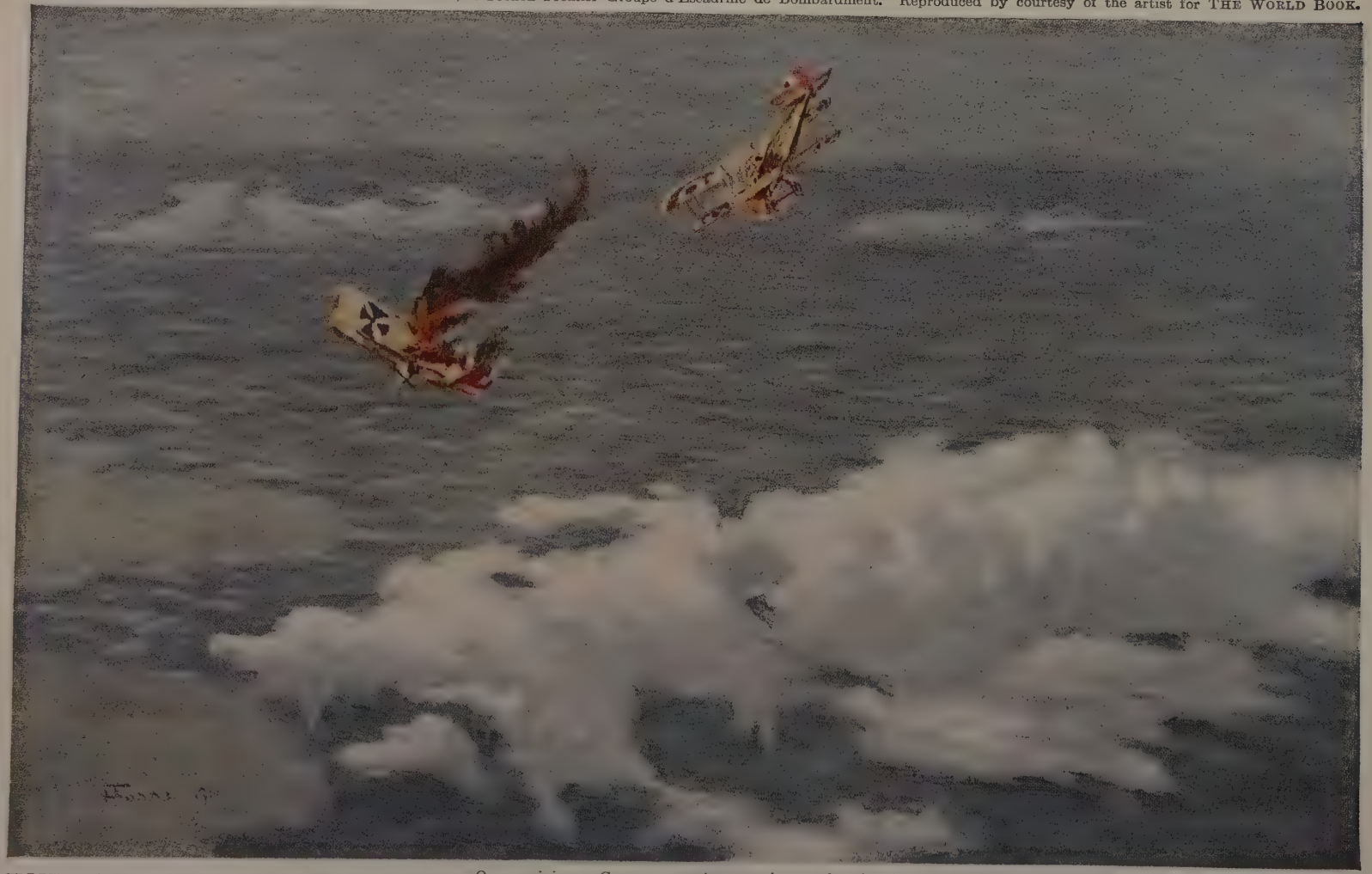
An American invention revolutionized the intelligence departments of the armies of the world. Flying machines were used for the first time in war in 1914; they were utilized for scouting—for observing the positions and strength of the enemy and for the purpose of taking photographs—but not in that year for fighting. In 1914 the best machines could fly ninety miles an hour and could carry two persons; early in 1916 the French government would accept no machine unless in its trial flight it could go 160 miles an hour, and carry two men and 800 pounds additional weight. A year later 175 miles per hour was possible, and good machines could carry a ton of bombs and machine guns. One giant machine carried twenty passengers for an hour.

In 1914 heights of 6,000 to 10,000 feet were the average points of observation; in 1917 aërial battles, participated in by from three to a dozen machines, were fought 20,000 feet—nearly four miles—above the earth. Electrically-heated clothing and special engine devices make it possible to reach, and remain at, such distances above the ground. Motors of 120-horse power satisfied aviators in 1914; in 1917 double motors of over 200-horse power each were common. Before the end of the latter year it was declared that one man in the air was worth a thousand men on the ground. Such is the brief record of improvement of one of the main dependencies of the armies in the war.

When the war began there were fewer than 500 flying machines in England, France and Germany. France had the greatest number, estimated at 250; England the smallest number, believed to be about ninety. Almost at once their paramount importance was recognized, and every nation engaged hurriedly in their manufacture. When it was discovered they could be used for other purposes than for observation, they first became the eyes of the artillery. From aloft the air man began to direct the gunners by wireless; ranges would be found, shots would be directed, degree of error wired to earth and adjustment made. During the last week of the war American airships were directed by wireless telephone. Soon airships carried bombs for the destruction of military depots, railroad trains, camps and ammunition factories. As aviators grew bolder they flew low with incredible speed over enemy lines—sometimes 200 feet above the ground—and sent down into their ranks destructive machine gunfire.

Aërial battles became common through the efforts of each side to force the enemy out of the air. Before the end of 1917 mastery of the air on the western front was possessed by the allies.

From painting by Lieutenant Henri Farre, artist and aviator, in French Premier Groupe d'Escadrille de Bombardment. Reproduced by courtesy of the artist for THE WORLD BOOK.



**EXPLOIT OF CAPTAIN BONE.** On perceiving a German aeroplane coming to drop bombs on houses near the shore, Captain Bone (British) gave chase, overtook him, and brought him down in the sea.

From painting by Lieutenant Henri Farre, artist and aviator, in French Premier Groupe d'Escadrille de Bombardment. Reproduced by courtesy of the artist for THE WORLD BOOK.

## 45th VICTORY OF GUYNEMER.

The German aeroplane is in a spinning nose dive. Its pilot and observer were thrown out into the sea by the violence of the motion. Guynemer was the leading French aviator until his death.

**The "Liberty Motors."** After the United States entered the war the necessity of American participation in airship building was pressed home upon the officials of that government. The best engineers of the country gave their entire attention to producing an engine for airships which should excel the best efforts of the Old World and assure a type of flying machine superior to anything known to the enemy. In September, 1917, it was announced that an engine which met the demands had been made, and it was named the "Liberty motor."

Plans were well matured before the end of 1917 for completing a great number of airships by early spring of 1918 and of rapidly increasing the output until a "cloud of witnesses" in the air in Europe should attest America's earnestness in entering the war. Thousands of aviators in various camps in the United States were preparing to take their places by the side of the airmen of the allies.

**The Zeppelins.** At the beginning of the war the German government placed great reliance upon its great Zeppelins—dirigible balloons 600 feet long, with four powerful motors developing over 500-horse power. Count Zeppelin, their inventor, died in 1917, at just the time his mammoth ships of the air were declared not to have achieved the success that was anticipated for them. However, they were of signal service to Germany, especially in long-distance raids over England and France for the purpose of dropping deadly bombs upon enemy territory. The Germans ordered raids not only upon unfortified towns and villages but upon hospitals far back of the allied fighting lines.

At first the night visits of these monstrous engines of death caused consternation, but as their visits became more common, even though death followed in their path, they were viewed less with alarm than with rage; the killing of noncombatant women and children could possess no military advantage unless the nation could be intimidated and made to cry for peace. Over twenty raids occurred in various parts of England in 1916, sometimes by Zeppelins, but as frequently by mammoth biplanes. During that year 225 people were killed and 672 were wounded. In 1917 the raids were still more numerous, the proportion of deaths and injuries being practically the same. England and France refrained from retaliation in kind but limited their raids to military objectives, going far into enemy territory.

Against the night raids of the Zeppelins the English and French used fleets of airships and powerful anti-aircraft guns; these were often effective in bringing down the enemy, but late in 1917 the Zeppelins flew so high that gunfire was ineffective. The greatest single loss suffered by Germany in these excursions was the destruction of five mammoth Zeppelins and the capture of another, in France, when the monsters became lost on their return from England. It was declared that the six accounted for that day in October represented one-half of Germany's "superdreadnaughts." With these losses Zeppelin raids ceased.

## *Submarines in the War*

The part played in the great conflict by submarine torpedo boats ranked them from the first as one of the most terrible engines of destruction. Had it not been for almost superhuman defensive efforts of the countries open to their attack they might have been the deciding factor in the struggle.

In rapid development of all means of offense and defense the submarines built by Germany are entitled to first mention, for from craft with a length of 125 feet they increased in size to nearly 400 feet, though of the latter monsters there were but few. Germany was obliged to turn its inventive genius to the building of these undersea terrors if its power were to be felt on the seas, for its great navy was destined to remain useless.

In the first two months after the first declarations of war German submarines in the North Sea destroyed many big British cruisers and several battleships; in one day the *U-29,* one of the most famous of the submersibles, sank three, representing a value of $12,000,000. One of the most famous exploits early in the war was a trip of 5,000 miles by the *U-51,* from Germany to the Dardanelles, eluding scores of dangerous spots en route and sinking two British battleships engaged in the Dardanelles campaign. Later, U-boats sank vessels close to America's shores.

**The "War Zone."** As long as Germany limited its submarine activity to attacks sanctioned by the accepted rules of war no enemy nation could complain, even though severely punished, and neutral countries viewed the situation without prejudice. It was not long, however, before the Germans refused to recognize the rules of warfare, which it had helped to

frame, and it began early in 1916 indiscriminate destruction of merchant ships, their cargoes and their crews, within a great sea area around the British Isles, the eastern coasts of Europe and in the Mediterranean. The "freedom of the seas" became an empty phrase to neutrals; they had greater cause for complaint than had belligerents, although by treaties signed by twenty-nine powers it was agreed that merchant vessels, even of warring powers, carrying contraband of war must be searched and their passengers and crew provided for before the vessels and cargoes were confiscated or sunk.

Whenever a submarine could sink a vessel daring to enter the "war zone" it did so, regardless of its mission or of its nationality. The British nation, having the largest tonnage of any country and being closest to Germany on the sea and the particular object of German hatred, suffered most. There was no discrimination, however, for friendly Norway suffered more severely, in proportion to its tonnage. The American phase of this controversy is further outlined in the subtitle below, *The United States in the War.*

Dispatches reporting almost daily loss of life were becoming so common that they ceased to thrill, but on May 7, 1915, there flashed over the cable news of the sinking of the great liner *Lusitania,* with the loss of 1,198 men, women and children, which so shocked the world that for a time the submarine menace held first place in the councils of the nations.

**"Unrestricted Warfare."** On February 1, 1917, after only twenty-four hours' notice of its intention, Germany began what was at once termed "ruthless submarine warfare." It announced that it intended to destroy all vessels, of whatever class, wherever found. It was estimated that this destruction, if it could reach 1,000,000 tons a month, would destroy England within four months by starving its inhabitants, and bring victory to the central powers and a peace dictated by Germany. The estimate may have been very accurate, for it must be remembered that when a 10,000-ton vessel was sent to the bottom with a full cargo the value of the boat was a small fraction of the loss; from $2,000,000 to $10,000,000 was represented in its cargo.

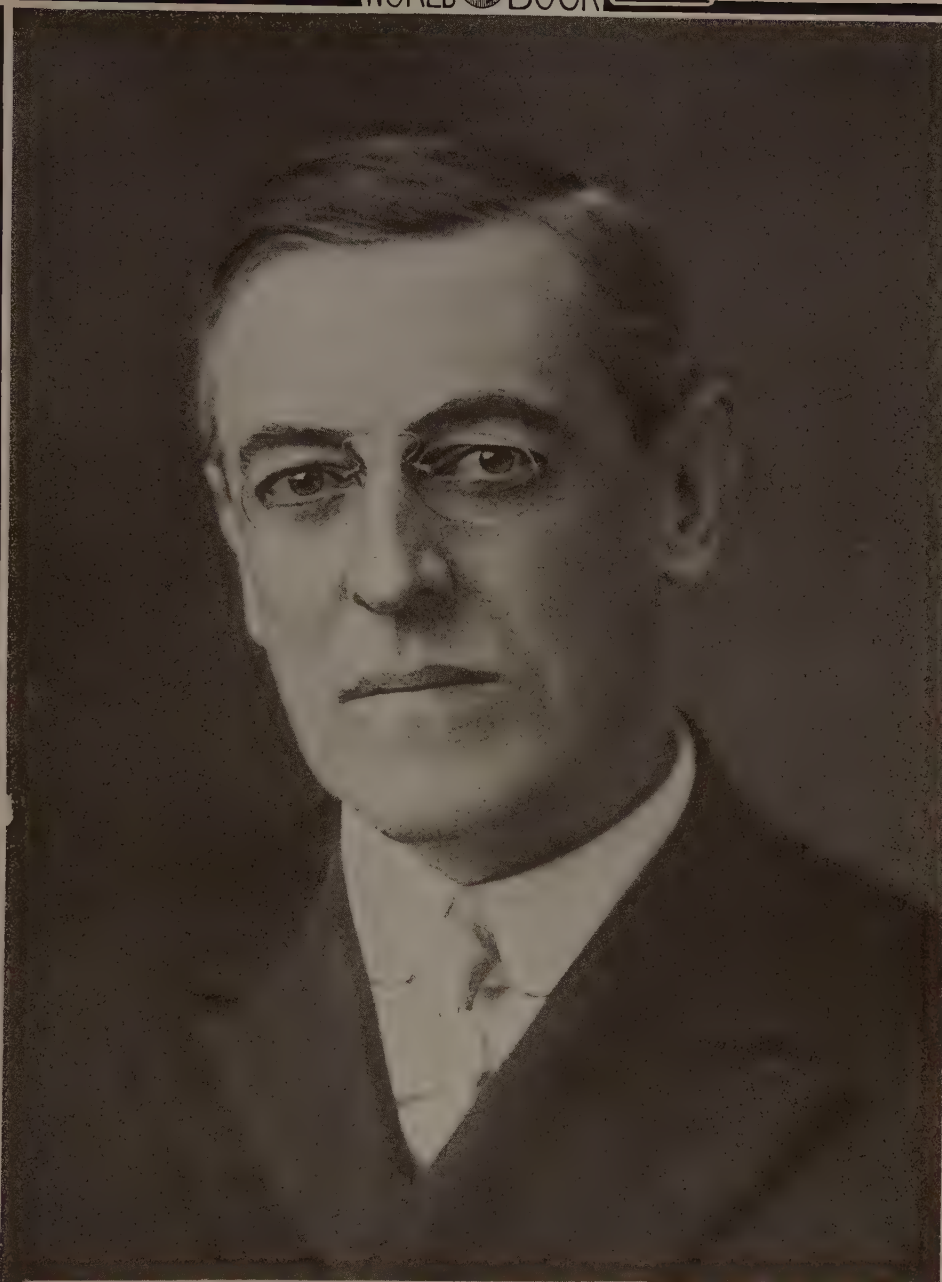
Through mighty efforts of the British and the French, with the help of the United States from the month of May, the German expectation was not realized. The greatest losses for any month did not exceed 600,000 tons, and the submarine toll gradually decreased to an average of one-third of that tonnage. Greatly increased shipbuilding operations replaced a considerable part of this wastage, and so deeply were plans of offense and defense laid that in 1918 the submarines were fairly beaten.

*Actual Shipping Losses.* In December, 1918, there was published an official announcement of losses in the world's merchant shipping due to the action of submarines and to submarine mines. Submarine boats were charged with by far the greater part of this loss. From the beginning of the war to October 31, 1918, there were destroyed 15,053,786 gross tons of merchant vessels. During the same period, due to intense activity on the part of Great Britain, France and the United States, there were constructed 10,849,527 tons. Enemy vessels which had been interned or captured were pressed into allied service, and thus 2,392,675 tons of enemy boats served the allies. This made the net loss of tonnage 1,811,584 tons.

Naturally the United Kingdom of Great Britain and Ireland suffered most heavily in shipping losses. British merchant tonnage sent to the bottom of the ocean during the war totaled 9,031,828 gross tons. New construction in the same period was 4,342,296 tons; purchases abroad were 535,000 tons, and enemy tonnage confiscated amounted to 716,520 tons. The net British loss was 3,443,012 tons.

**Submarine Losses.** A submarine is difficult to capture or to destroy. Those of the most modern type can rise near enough to the surface for the periscope to be used, can fire a torpedo and disappear again, all in less than one minute. The best submarines to-day do not *sink;* they literally *dive.* Moreover, they are provided with guns which have a greater range than the guns which were placed upon merchant vessels for their defense, and they could appear above water and at their pleasure destroy by gunfire any vessel with less effective weapons. Torpedoes are so expensive (see page 5841) that they are not employed to sink a vessel if it is safe for the submersible to rise to the surface and use its guns.

The undersea boats are afraid of naval vessels, and especially of the fleet "submarine chasers" with which the defenders of the seas were beginning to be well equipped. Numerous devices were employed to destroy submarines. Great steel nets were stretched across the English Channel, and they made that waterway practically safe for the enormous traffic between England and France. Depth bombs, timed to



"The world will never be the same again after this war is over. The change may be for weal or it may be for woe, but it will be fundamental and tremendous."

Woodrow Wilson

**THE AMERICAN WAR PRESIDENT.**

Woodrow Wilson, on whom fell the great burden of America's participation in the world's great-
est military struggle

# *THE WAR MESSAGE OF THE PRESIDENT*

**Extracts from his address before Congress, 8:30 P. M., April 2, 1917.**

* * * * On the 3rd of February last I officially laid before you the extraordinary announcement of the Imperial German Government that on and after the first day of February it was its purpose to put aside all restraints of law or of humanity and use its submarines to sink every vessel that sought to approach either the ports of Great Britain and Ireland or the western coasts of Europe or any of the ports controlled by the enemies of Germany within the Mediterranean. That had seemed to be the object of the German submarine warfare earlier in the war, but since April of last year the Imperial Government had somewhat restrained the commanders of its undersea craft, in conformity with its promise, then given to us, that passenger boats should not be sunk and that due warning would be given to all other vessels which its submarines might seek to destroy, when no resistance was offered or escape attempted, and care taken that their crews were given at least a fair chance to save their lives in their open boats. The precautions taken were meagre and haphazard enough, as was proved in distressing instance after instance in the progress of the cruel and unmanly business, but a certain degree of restraint was observed.

The new policy has swept every restriction aside. Vessels of every kind, whatever their flag, their character, their cargo, their destination, their errand, have been ruthlessly sent to the bottom without warning and without thought of help or mercy for those on board, the vessels of friendly neutrals along with those of belligerents. Even hospital ships and ships carrying relief to the sorely bereaved and stricken people of Belgium, though the latter were provided with safe conduct through the proscribed areas by the German Government itself and were distinguished by unmistakable marks of identity, have been sunk with the same reckless lack of compassion or of principle. * * * *

It is a war against all nations. American ships have been sunk, American lives taken, in ways which it has stirred us very deeply to learn of, but the ships and people of other neutral and friendly nations have been sunk and overwhelmed in the waters in the same way. There has been no discrimination.

The challenge is to all mankind. Each nation must decide for itself how it will meet it. The choice we make for ourselves must be made with a moderation of counsel and a temperateness of judgment befitting our character and our motives as a nation. We must put excited feeling away. Our motive will not be revenge or the victorious assertion of the physical might of the nation, but only the vindication of right, of human right, of which we are only a single champion. * * * *

The German Government denies the right of neutrals to use arms at all within the areas of the sea which it has proscribed, even in the defense of rights which no modern publicist has ever before questioned their right to defend. The intimation is conveyed that the armed guards which we have placed on our merchant ships will be treated as beyond the pale of law and subject to be dealt with as pirates would be. Armed neutrality is ineffectual enough at best; in such circumstances and in the face of such pretensions it is worse than ineffectual; it is likely only to produce what it was meant to prevent; it is practically certain to draw us into the war without either the rights or the effectiveness of belligerents. There is one choice we cannot make, we are incapable of making; we will not choose the path of submission and suffer the most sacred rights of our nation and our people to be ignored or violated. The wrongs against which we now array ourselves are no common wrongs; they cut to the very roots of human life. * * * *

With a profound sense of the solemn and even tragical character of the step I am taking and of the grave responsibilities which it involves, but in unhesitating obedience to what I deem my constitutional duty, I advise that the Congress declare the recent course of the Imperial German Government to be in fact nothing less than war against the Government and people of the United States; that it formally accept the status of belligerent which has thus been thrust upon it; and that it take immediate steps not only to put the country in a more thorough state of defense, but also to exert all its power and employ all its resources to bring the Government of the German Empire to terms and end the war. * * * *

We have no quarrel with the German people. We have no feeling toward them but one of sympathy and friendship. It was not upon their impulse that their Government acted in entering this war. It was not with their previous knowledge or approval. It was a war determined upon as wars used to be determined upon in the old, unhappy days, when peoples were nowhere consulted by their rulers, and wars were provoked and waged in the interest of dynasties or of little groups of ambitious men who were accustomed to use their fellow-men as pawns and tools.

Self-governed nations do not fill their neighbor states with spies or set the course of intrigue to bring about some critical posture of affairs which will give them an opportunity to strike and make conquest. * * * *

One of the things that have served to convince us that the Prussian autocracy was not and could never be our friend is that from the very outset of the present war it has filled our unsuspecting communities, and even our offices of government, with spies and set criminal intrigues everywhere afoot against our national unity of counsel, our peace within and without, our industries and our commerce. Indeed, it is now evident that its spies were here even before the war began; and it is unhappily not a matter of conjecture, but a fact proved in our courts of justice, that the intrigues which have more than once come perilously near to disturbing the peace and dislocating the industries of the country, have been carried on at the instigation, with the support, and even under the personal direction of official agents of the Imperial Government accredited to the Government of the United States. * * * *

The world must be made safe for democracy. Its peace must be planted upon the tested foundations of political liberty. We have no selfish ends to serve. We desire no conquest, no dominion. We seek no indemnities for ourselves, no material compensation for the sacrifices we shall freely make. We are but one of the champions of the rights of mankind. We shall be satisfied when those rights have been made as secure as the faith and the freedom of nations can make them. * * * *

To such a task we can dedicate our lives and our fortunes, everything that we are and everything that we have, with the pride of those who know that the day has come when America is privileged to spend her blood and her might for the principles that gave her birth and happiness and the peace which she has treasured.

explode at any desired depth in the water, were dropped over the spot where a submarine had sunk; if rightly placed, these devices were almost certain to destroy the enemy. Vessels were painted strangely, to blend in color with the sea and sky—a protective device known as *camouflage;* their upper works and stacks were removed; hard coal, instead of soft, was used; smoke screens—vast clouds of smoke from recently-perfected devices—hid the vessel from the enemy so that he could not know exactly where to strike. These were among the means which defeated the submarine assaults of the central powers.

German sailors did not know how many of these boats were destroyed or captured; they only knew their brothers left on the perilous missions and in many cases were never heard from again. Service on these vessels was early in the war sought as an honor; later it was shunned. A naval riot in October, 1917, was alleged to be due to the refusal of sailors to serve on submarines because of their horror of the service. E.D.F.

## *The United States in the War*

"They say, who have come back from Over There, that at night the troubled earth between the lines is carpeted with pain. They say that Death rides whistling in every wind, and that the very mists are charged with awful torment. They say that of all things spent and squandered there, young human life is held least dear. It is not the pleasantest prospect for those of us who yet can feel upon our lips the pressure of our mothers' good-bye kiss. But, please God, our love of life is not so prized as love of right. In this renaissance of our country's valor, we who will edge the wedge of her assault make calm acceptance of its hazards."

**America's Peaceful Attitude.** From their position of "splendid isolation" the people of the United States long viewed the war in Europe as a thing apart from their vital interests. Three thousand miles of water separated their eastern seaboard from Europe's diplomatic labyrinths; America had no political interests in Europe, and Europe for nearly a hundred years had clearly understood that it could not hope to build up interests on the western shores of the Atlantic. Washington's plea that the country should enter into no entangling alliances had always been held one of the Union's cardinal principles, almost as binding as an article of the Constitution.

When the war commenced the President of the United States enjoined upon the people the strictest neutrality, and all the powers of the government were invoked to avoid giving offense to any belligerent. So entirely just were the decisions of officials on matters relating to neutrality that each warring state, on occasion, complained that the President favored the enemy. On the other hand, frequently in the dire stress of events the nations at war overstepped the bounds of law and offended the United States. In justice to the records it must be said that in all cases excepting those involving Germany's disregard of American rights, reparations and apologies nearly always followed, and with reasonable promptness; also not one American life was sacrificed by wrongs committed by the allies. American neutral sentiment was repeatedly strained to the breaking point by Germany's open offenses against the rights of noncombatants, for whom the United States, as the most powerful neutral, felt obliged to speak.

Not only did America seek to remain at peace, but on proper occasions it offered its good offices to end the war. It did so, in 1915, and in 1916, with but little hope of immediate success. Again, in November, 1916, when official America must have known of the imminent peril confronting the country, President Wilson addressed the warring nations, asking that each make known its war aims. He declared the United States to have a "vital interest in measures to be taken to secure the future peace of the world." The reply of ten allied nations made it clear that the end of strife was not in sight, for they demanded restoration of territory seized, evacuation of invaded provinces, indemnities

for wrongs committed and the reorganization of Europe on a basis of nationalities and full security for the peace of the future. Germany's reply was a scathing denunciation of the allies.

**Offenses Against the United States.** It must long have been evident to officials, though not within the knowledge of the masses of the people, that the United States was fated to take its place among the nations fighting to destroy a monstrous military system. Forebodings of serious business ahead there were in plenty. Among the offenses giving cause for open disagreement which were known to all people were the following:

(1) Germany's anger against the United States, constantly increasing, because of its sale of munitions to the allies. The Teuton state declared it to be an unneutral business, notwithstanding the fact that Germany could have had like favors. It explained its position by declaring that inasmuch as it could not get such goods into Germany because of the blockade America therefore had no right to sell to the allies. However, during the Russo-Japanese War Germany sold munitions to Russia; in the Spanish-American War, to Spain; and in the South African War, to the British, when the Boers were isolated and could not purchase in Europe—a situation identical with that of Germany after 1914. The laws of nations permit neutrals thus to serve belligerents. Had the United States withheld its product from Europe, it has been officially pointed out, it could never hope for like purchases on its own account on some future occasion of dire need.

(2) The loss of 102 Americans among 1,198 victims of the sinking of the *Lusitania,* on May 7, 1915, by a German torpedo. Germany declared it was not responsible for the deaths of Americans on the ground that the Germany embassy in Washington had publicly warned passengers not to embark upon the vessel. The Imperial Government placed responsibility upon Great Britain, because of its blockade of German ports. This tragedy resulted in several notes to the German government upholding the rights of neutrals to freedom of the seas: it was contended that the *Lusitania* was a merchant vessel, subject to search and seizure, if found to contain contraband, but that the laws of nations guaranteed the safety of non-combatants. The wanton act horrified the people. Germany, after much debate upon the subject of neutral rights, gave its promise not to torpedo vessels of commerce without warning and without assuring the safety of passengers.

(3) During 1915 and 1916 over 3,000 lives were lost on passenger vessels by means of German torpedoes; the duty of searching and seizing was ignored, and destruction and death came without warning. Fully 200 of this number were Americans. The American government sent protests continually to the Imperial German government.

(4) Plots in the United States whose successful execution resulted in great material damage and loss of life. These were proved in many cases to have been instigated by German emissaries, and were directed largely against manufacturing plants engaged in the production of munitions. There were nine of first magnitude in 1915, and over twenty which were less serious. In 1916 and 1917 the number was reduced materially by the arrest of conspirators and the vigilance of the secret service.

(5) The "war zone" in European waters, into which no merchant vessels were to be allowed by Germany without receiving its permission. This order would have made a considerable part of the high seas a German ocean had the mandate been respected. The United States government was told it could send one passenger vessel each week to England, through a lane designated by Germany, provided it painted said vessel in certain colors for complete identification. This attempt to destroy neutral rights further aroused the nation and led to arming merchant ships for their protection, a circumstance which greatly angered Germany and led to the most serious indictment against it, named below.

(6) Unrestricted submarine warfare. President Wilson had extracted a promise of visit and search before destruction of a merchant vessel, but after arming of merchant ships Germany declared such action was a menace to submarines, and the promise was withdrawn. In its place, on February 1, 1917, after one day's notice, announcement was made that unrestricted submarine warfare would be resorted to and that all vessels, wherever found, would be sunk without warning.

This breach of faith led at once to the dismissal, on February 3, of the German ambassador, Count Von Bernstorff, from the United States, and the recall of James W. Gerard, American ambassador, from Berlin.

**More Potent Causes for War.** Millions of people failed to see even in German ruthlessness at sea adequate cause for war involving the American republic, and were puzzled when they observed official Washington leading the nation toward hostilities. It was felt that the government possessed information not known to the general public, and this proved to be true.

*The Russian Situation.* The uninformed world was pleased with Russia's part in the plan of the allies; every government, however, knew that treason to the entente's cause was working in Russia, and that the czar expected to reach a separate peace with Germany. It was a strange situation; when in the third year of the war it had been expected that that country would be ready to throw mighty forces against the central empires, German intrigue at the court of the czar and in the Ministry was thwarting Russia's efficiency as an ally. The czarina, a German princess, of stronger will than the czar, had from the beginning opposed the war and had worked unceasingly for a separate peace. The great bureaucrats of the

Empire secretly favored friendly relations with Germany. All this was known to every government. Behind the scenes it was not the situation on the western front, the Italian front, the Zeppelin menace or the submarine outrages that disturbed the nations, but the menace of Russian defection, which would make that nation a neutral and open its vast southern grain fields and oil riches to Germany and Austria-Hungary.

Such an end of allied hopes might result in turning the tide of victory to Germany. The kaiser's intentions towards America were openly hostile. Were Germany to win he had declared that the only nation which could pay indemnity would be the United States, and from America he would exact a penalty. The American government was convinced that to stand aloof meant that some day the United States would have to meet an invading army on its shores and fight alone for its liberties.

There were other circumstances which appeared to confirm the correctness of this view.

**The Mexican Plot.** Count Von Bernstorff, in good repute with the public, was known by the government, before his dismissal from Washington, to have been the virtual head of the system of plotting in which Germany was engaged in the United States. Through his hands passed documents relating to an international plot of astounding proportions, all of which was revealed later by means which have not been disclosed. Anticipating a break with the United States, Germany proposed a coalition with Mexico and Japan, in case of war, by which America would be punished by the three, each to take such territory as seemed proper. Mexico was offered the western states it lost to the United States in 1848. This was but one evidence of what the kaiser hoped to do to the Monroe Doctrine.

**Intrigue in South America.** Further evidence of German intention to establish permanently its influence in the Americas was made public. In Southern Brazil there had been colonized a half million Germans. At the proper moment Brazil's southernmost state was to be seized, and there would have been a German state in South America. In November, 1917, the Brazilian government was severely taxed to put down disorders in that part of the republic.

A German diplomatic officer in Argentina, ignoring the indelicacy, not to say illegality, of his acts, used his office to advise his government, through a neutral power without that neutral's knowledge, to sink Argentine vessels as they approached the shores of France, "without leaving a trace."

Other acts made it positively clear that America must arm itself against plots which cool calculation had projected against the peace and security of the western hemisphere.

**An End to Hesitation.** President Wilson was loath to commit the United States to a part in the titanic struggle, though there is evidence that for many months he foresaw the inevitable. Early in 1916 he stated in a public address that the world was on fire and the sparks were falling dangerously near the republic; he asked his auditors, "Are you ready for the test?" That he felt militant action would not be endorsed at the time is evident. He had kept the nation out of war, for which the people were grateful, and largely on that issue he was reëlected President. But the inexorable logic of the situation speedily forced an unprepared country to bear its share of the burden of defending the world against aggression.

*The Appeal to Congress.* On April 2, 1917, at the call of the President, the Congress of the United States met in special session to consider the grave situation. The central figure in one of the most dramatic scenes in the history of the nation, President Wilson stood before the Congress and told of his labors to maintain the peace; of the pledges given and broken by the power the nation was destined to assail; of the daring affronts of its diplomatic agents; of the plots against the security of the republic and of the certainty that patience could not longer be exercised. He did not ask for a declaration of war against the German Empire, but declared that on the part of Germany there had been virtual war against the republic for many months. Rather, he asked Congress to declare that a state of war existed, to the end that the United States might help "make the world safe for democracy."

*The Response.* The message of the President sounded a call which stirred the conscience of America and lifted the nation to a high plane of sentiment. This was reflected four days later in the following declaration, passed April 6, and the same day approved by the President:

JOINT RESOLUTION

Declaring that a state of war exists between the Imperial German Government and the Government and the people of the United States and making provision to prosecute the same.

Whereas the Imperial German Government has committed repeated acts of war against the

Government and the people of the United States of America: Therefore be it

*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled:* That the state of war between the United States and the Imperial German Government which has thus been thrust upon the United States is hereby formally declared; and that the President be, and he is thereby, authorized and directed to employ the entire naval and military forces of the United States and the resources of the Government to carry on war against the Imperial German Government; and to bring the conflict to a successful termination all of the resources of the country are hereby pledged by the Congress of the United States.

The vote in Congress was not unanimous. In the House 373 voted for war and 50 opposed the resolution; in the Senate the vote was 80 to 6. However, on a test vote of loyalty within ten days vast appropriations were provided without a dissenting vote. Only twelve members were shown in opposition, and they refrained from voting. Nearly fifty members who for reasons of conscience had opposed the resolution of April 6 put themselves on record as unquestioned supporters of the government after the irrevocable step had been taken.

**War Preparations.** For more than two years the demand had been growing for universal military training, but quite regardless of the seeming necessity for preparedness the nation had taken practically no action. Volunteer training camps were established for a month in 1916 in several locations and thousands of young men joined them. This was not done with the avowed object of war preparation, but was a response to the national urge that Americans should learn the arts of war.

With the declaration of a state of war existing the total unpreparedness of the nation was everywhere evident. It was at first believed that few, if any, soldiers would be sent to the battle fields of Europe; the United States proposed to help the allies with money, food, clothing and munitions of war. However, there was an immediate call for volunteers to fill the quota of the regular army, navy and marine corps, and to bring the national guards of the states to full strength. Within about three months over a million volunteers had responded to the call.

**Selective Draft.** Before this had been accomplished it became evident that the allies must have American man power in Europe, and Congress, after much debate, passed a conscription, or selective draft, law, calling to the service of the nation all men fit for duty between the ages of twenty-one and thirty (to the thirty-first birthday). The popular acceptance of this law was astonishing. There were those who protested loudly against such a departure from American precedents, but the protests were lost in the great patriotic response to the demand of the law for registration for service. Almost 10,000,000 young men registered on June 5. Not all of these could the government expect to call to arms; the question of exemption for cause, however, had nothing to do with the duty of enrollment.

In every registration district those enrolled were numbered, and through a drawing in Washington it was determined who should first present themselves before examining boards. On September 2 a half million of those accepted were called to training camps, and they became at once soldiers of the United States. During the next year those who had just reached the age of twenty-one were enrolled, and later there was an enrollment of those between thirty-one and forty-five. These were never called, however.

**The Navy at Work.** Immediately following the beginning of the war the United States navy was actively engaged, in union with Great Britain and France. The submarine menace hung over the world, and it became America's duty to assist in the hunt for the elusive undersea enemy. In May announcement was made that numerous vessels of the navy were in Eastern Atlantic waters, under command of Rear-Admiral Sims, where they joined a British squadron. The larger vessels of the navy, in various units, were placed on patrol duty near American waters, relieving French and British ships that had held a western watch for three years.

**Soldiers in Europe.** In July the arrival of the first contingent of American troops in England and France was announced from Washington. They were under the command of John J. Pershing, who sailed with the rank of major-general but was at once raised to the rank of general. The submarine peril made it inexpedient to disclose transport operations. The Secretary of War announced that early in 1918 there would be 500,000 soldiers in France. The first casualty to transports occurred when the *Tuscania* was torpedoed and about 200 Americans lost their lives. This was on February 10, 1918.

Late in October the government announced that the training of the early contingents had been completed on French soil and that the

Copyright: International Film Service.

**WHERE AMERICAN SOLDIERS ARE TRAINED.**

This is Camp Grant, at Rockford, Illinois. All the National Army camps are similar; each is several miles in length and breadth.

Copyright: International Film Service.

## A WELCOME TO ENGLAND.

A little London miss greets the soldiers of the United States as they march through the streets to be reviewed by the king.

Official British War Photograph.

## AMERICAN SOLDIERS IN LONDON.

A photograph of the first contingent of United States troops crossing the Thames after their historic review by the king. The Houses of Parliament are in the background.

French Official Photograph.

**AMERICANS IN FRANCE.** In the front row, from right to left, are Premier Painleve of France (1917), President Poincare, General John J. Pershing and Major-General William L. Sibert. Behind are members of the French and American staffs.

"boys" were starting in small contingents to the battle line. They first occupied positions near the Marne River, where on November 3 the first Americans, three in number, were killed in a surprise night attack. Five Americans were

FIRST AMERICAN LOSSES

According to a German official report the first prisoners from the United States forces were taken before daylight on Nov. 3, along the Rhine-Marne Canal, which crosses the battlefield 25 miles east of Nancy, as shown by arrow.

wounded and twelve were taken prisoner—the first casualty list of United States troops in action.

When the much-heralded German offensive of March, 1918, began, General Pershing offered his entire American resources in men, munitions and supplies to General Foch, head of the allied forces, to be used by him in any manner desired. It was then disclosed that over 250,000 men were thus added to the allied defense; this force was mixed with the French and British at needed points. Two months later, with steady accessions to the fighting front, the fact was announced that entire American divisions were ready for battle, and that the line held solely by America on the French front was third in length among the allies—France first, Great Britain second, America third, Belgium fourth.

During the last days of May, 1918, soldiers were leaving America for Europe at the rate of 100,000 every eleven days. It was promised that one year from the day American troops first landed in France there would be 1,000,000 of them across the Atlantic. As a matter of fact, there were but a few hundred less than 2,000,000 "over there" on October 30, 1918, and 1,500,000 others were nearly ready to go.

By authority this summary was made:

"America has raised and equipped a bigger army in shorter time and now holds a greater section of the fighting front, transporting her forces 3,000 miles across an infested sea, in ten months, than Britain did in twelve months across the English Channel of less than thirty miles. We began with less, went further, and arrived with more in a shorter time."

What the United States accomplished in France in less than a year to care for its military establishment was a remarkable achievement. The government had made its own port in France, with accommodations for scores of vessels at one time; it built over 800 miles of double-track railroad and stocked it with better equipment than any European railroad possesses; it built freight yards greater in extent than the largest in any American city, and set up its own telegraph and telephone systems and put 12,000 American operators in charge. It built ten "towns" of warehouses to shelter supplies. This is but a mere outline of what has been accomplished.

**Preparations for War in the Air.** The War of the Nations developed new and startling devices of offense and defense. The most feared of these were the improved and enlarged submarines; the most spectacular and one of the most valuable was the flying machine. Supremacy in the air might decide the European contest. The allies were fast reaching a decided superiority over the Germans in this department; in order that the supremacy might be overwhelming the United States was urged to build a vast fleet of machines for air fighting. Accordingly, in July, 1917, Congress appropriated $640,000,000 for the construction and operation of the largest fleet of air craft possessed by any nation. Eighteen great training camps were established for instruction of aviators, and great factories were given over exclusively to the building of machines. The most significant feature of this war enterprise, after the very generous appropriation which disclosed the earnestness of the nation, was the development of the new "Liberty motor" by American engineers, referred to on page 6171.

The rapidity of aircraft production was disappointing; an investigation into the causes of the delay was made by the President under the direction of Charles Evans Hughes, in June, 1918. It severely censured those responsible for waste of time and money. In the meantime American aviators were using allied machines. Only during the last months of the war were American "Liberty" planes in commission.

**The Staggering Cost in Money.** On page 6136 a table is printed which summarizes the world's expenditures for previous wars. All other conflicts seem but inexpensive incidents when compared with the sums swallowed up in the War of the Nations.

On April 17, 1917, without a dissenting vote in either house, Congress appropriated $7,000,000,000 for war purposes—more than twice the cost of the War of Secession; this was the largest single war loan ever attempted by any government; $3,000,000,000 of that sum it was proposed to loan to America's European allies. The Washington government was spending early in 1918 $24,500,000 each day, including loans to the allies; the daily total was rapidly increasing, and it was believed that the yearly cost of the war would require $25,000,000,000. This represents more than Great Britain had expended in the first three years of the conflict, and is explainable on the ground that in no department was the country prepared for even a small war. In June, 1918, Congress appropriated $11,000,000,000 for military operations for the year beginning July 1.

Every possible means was put into law to raise the vast sums required. The income taxes were increased, and exemptions were lowered. No single person with an income exceeding $1,000 and no married man receiving over $2,000 yearly escaped taxation of two per cent. Above $4,000 incomes the tax rapidly increased; the man with a yearly income of $1,000,000 was compelled to give almost one-half. In addition, postage rates were increased; taxes were levied upon freight rates, upon telegrams, new insurance, and many other items. Another means of raising money was by the sale of government bonds, popularly designated as "Liberty bonds."

**Government Bond Issues.** In the third month of American participation in the war the government offered for sale a bond issue of $2,000,000,000, payable in thirty years, bearing interest at three and one-half per cent and not taxable. The sale closed June 25, and the issue was more than fifty per cent oversubscribed; $3,035,226,850 worth of bonds was sold. In October the second "Liberty loan" was called for, and the interest rate was fixed at four per cent; these bonds were taxable. The minimum amount asked was $3,000,000,000, and it, too, was oversubscribed, the total reaching the sum of $4,617,532,300. The third loan, called for in May, 1918, was for $3,000,000,000 and the amount subscribed by over 17,000,000 investors, was $4,100,000,000. In September, 1918, a fourth loan of $6,000,000,000 was called for, and $6,889,000,000 was subscribed. Later a fifth loan was announced, to be called for in April, 1919.

**Government Control of Railroads.** Throughout the summer and fall of 1917 the railroads of the United States failed to meet the unprecedented demands upon them. To unify operations and make of all roads in the country one harmonious system the government assumed control of them in December, with Secretary of the Treasury McAdoo as their head. He was given the title director-general of railroads. In May, 1918, he further emphasized the government's supreme command by removing all railroad presidents and placing at the head of each system a man chosen by the director-general. During the summer control of all telegraphs and telephones was vested in the Post-office Department.

**Other War Preparations.** Immediately following the declaration of war a National Council of Defense was organized in Washington, with supporting state councils in all the states. The National Council was composed of six members of the Cabinet and eight civilians.

Herbert C. Hoover, who had achieved a reputation as chairman of the Belgian Relief Commission, was named as food controller; later his committee was called the United States Food Administration Board. The gigantic task devolving upon Mr. Hoover was to order such conservation and distribution of America's food supply that there might be sufficient food for every American and enough to supply vast quantities imperatively needed by suffering Europe.

To the shipping board was assigned the task of providing at least 3,000 new vessels within the slightest possible period of time to carry supplies between the United States and Europe. The munitions board was charged with the task of providing everything needed in guns and ammunition. Great steel plants were practically commandeered, and they gave their entire resources to government work. E.D.F.

Consult Muir's *The Expansion of Europe;* Chevrillon's *England and the War;* Whitton's *The Marne Campaign;* Buchan's *The Battle of the Somme;* Brandes' *The World at War;* Smith's *Trench Warfare;* Aldrich's *On the Edge of the War Zone;* Beck's *The Evidence in the Case* (anti-German); Fullerton's *Why the German Nation Has Gone to War* (pro-German); Münsterberg's *The War and America.*

**Related Subjects.** Much material which will be helpful in gaining a clear understanding of the War of the Nations will be found in articles on the various countries concerned, under the sub-

title *History*. The following articles will also furnish much additional information as to various phases of the struggle:

Aisne, subhead *Battle of the Aisne*
Alsace-Lorraine
Balkan Wars
Belgrade
Bernstorff, Johann Heinrich, Count
Brussels, subhead *History*
Canada in the war, page 1129.
Carrel, Alexis
Constantine I
Dardanelles
Flying Machine
Foch, Ferdinand, 2241b.
Francis Joseph I
Gallipoli
George, David Lloyd
Gerard, James W.
Hindenburg, Paul von
Joffre, Joseph J. C.
Kitchener, Horatio Herbert
Liége
Lille
Louvain
Marne, subhead *Battle of the Marne*
Meuse
Monroe Doctrine
Namur
Nicholas II
Pershing, John J.
Pétain, Henri Philippe
Poincaré, Raymond
Red Cross Societies
Rheims
Saloniki
Sims, William S.
Slavs
Somme, subhead *Battle of the Somme*
Submarine
Submarine Mine
Torpedo
Triple Alliance
Triple Entente
Venizelos, Eleutherios
Verdun
Volunteers
William II
Wilson, Woodrow
Ypres

**WARRANT,** *wahr'ant,* a legal term for a document issued by a justice of the peace or other qualified officer, and directed to a constable or sheriff, authorizing him to perform a certain specified act. Without a warrant the performance of such an act is illegal.

**Bench Warrant.** This is a writ granted by a court authorizing the proper officer to arrest and bring before the court the person named and charged with contempt, crime or misdemeanor.

**Search Warrant.** This is a writ authorizing the officer named therein to search a house or other premises for goods held contrary to law, such as goods that have been stolen.

**WARRANTY,** *wahr'an ti.* See DEED.

**WAR'REN,** JOSEPH (1741-1775), an American patriot who lost his life in the Battle of Bunker Hill. He was called by Webster "the first great martyr in the great cause." Warren was a native of Roxbury, Mass., and was educated at Harvard. When the struggle against British oppression became acute he was practicing medicine in Boston. Devoting his voice, his pen and his influence to the patriot cause, he became a leading figure in the events leading to the outbreak of hostilities, and in April, 1775, was unanimously elected president of the provincial congress which met at Watertown, Mass. It was at Warren's request that Paul Revere made his midnight ride to Lexington on April 18, and to him is due much of the honor for the successful outcome of the battle of the following day.

Warren served as a volunteer under Putnam and Prescott at Bunker Hill, though he had attained the rank of second major-general of Massachusetts forces, and was killed in the final charge in that battle. In 1794 the Masonic Lodge of Charlestown erected a monument to his memory on the spot where he fell, and years later this memorial gave place to the present Bunker Hill Monument (see page 998).

**WAR'REN,** OHIO, the county seat of Trumbull County, situated on the Mahoning River, in the northeastern part of the state, fifty-two miles southeast of Cleveland. The population in 1910 was 11,081; in 1916 it was 13,059 (Federal estimate). Railroads entering the city are the Baltimore & Ohio, the Erie, the Mahoning Valley (electric) and the Pennsylvania. The Public Square, Packard Park, a Federal building, a public library and a hospital are features of note. Iron, steel, boilers, furniture and electric lamps are important articles of manufacture. Warren was settled in 1802 and was incorporated in 1834.

**WAR'REN,** PA., a borough and the county seat of Warren County, situated in the northwestern part of the state, nine miles south of the New York State line, and fifty-six miles northeast of Oil City. It is situated at the junction of the Allegheny River and the Conewango Creek, and is on the Pennsylvania Railroad and interurban lines. It is surrounded by a region rich in natural gas and oil, and the petroleum industries are important. There are also large boiler and machine shops. The State Hospital for the Insane is one of three hospitals. Warren has a public library, schools and parks. The place was settled in 1780, and was incorporated as a borough in 1832. Population in 1910, 11,080; in 1916, 14,737 (Federal estimate).

**WAR'SAW,** the capital, metropolis and intellectual center of the Russian government of Poland. It is situated on the south bank of the Vistula River, and is about 400 miles directly east of Berlin and 625 miles southwest of Petrograd. The western frontier of Poland and the eastern boundary of Germany adjoin, and the city of Warsaw was therefore exposed to attacks of the German forces during the War of the Nations. In 1915, when Poland was overrun by Von Hindenburg's army, the capital was evacuated by the Russians (see POLAND, page 4724), and was still in German hands at the close of 1917.

Except the oldest section, where the crooked lanes and curious old buildings have a mediæval appearance, Warsaw is a city of well-constructed streets and buildings. Palace Square, Castle Square, Theater Square, the magnificent Grand Theater, two spacious boulevards, parks and gardens, and numerous imposing palaces and cathedrals give the city an air of distinction. Of special interest among the palaces is the former residence of the Saxon-Polish kings, in Castle Square, now used for government purposes. The university, founded in 1816 and serving a student body of over 2,400 at the outbreak of the war, is housed in the Casimir Palace. Other educational institutions include a musical conservatory, an agricultural institute, an art school and a technical college.

Warsaw has long been a leading industrial and commercial center. When the war began the city had more than fifty book-printing plants, and flourishing factories producing machinery, food products, woven goods, boots and shoes and many other commodities. In normal years there is a thriving trade in corn, coal and leather. The city has had an eventful history, and its capture in 1915 was not the first disaster that had befallen it. At the outbreak of the war it had a population of 872,500.

**WAR'SHIP.** The modern warship, as naval men understand the term, has come into existence since 1900, and it is the result of centuries of invention and experiment. Warships are classified according to their armor, armament and power as dreadnaughts, or battleships of the first class; pre-dreadnaughts, or battleship cruisers; armored cruisers, gunboats, torpedo boats, destroyers, scouts, submarines and submarine chasers.

**The Dreadnaught.** The first battleship of this type, and the one from which the type takes its name, was the *Dreadnaught* of the British navy, completed in 1905. The distinguishing features of battleships of this type are their armor-plate protection and their armament by big guns. The following description gives one a good idea of the size and power of a battleship of the first class.

*The Arizona.* The *Arizona* of the United States navy, when it went into commission October 17, 1916, was considered to be the most powerful warship in the world. The ship is 600 feet long, ninety-seven feet beam, draws thirty feet of water and has a displacement of 31,400 tons. The sides of the *Arizona* are protected by a belt of armor plate seventeen feet, six inches wide, and thirteen and one-half inches thick. About eight and one-half feet of this belt extend below the water line, and the bottom of the ship is also protected against torpedoes. The turrets in which the heavy guns are mounted are of 18-inch armor plate.

The ship is driven by steam turbines and has a speed of twenty-one knots, or twenty-four miles, an hour. Oil is used for fuel, and the maximum storage capacity is 3,270 tons. The use of oil enabled the builders to place the boilers in one group and to connect them all with one funnel, protected by inclined armor.

The main batteries consist of twelve 14-inch guns mounted in four turrets on the median line of the vessel, two in the fore and two in the after part of the ship. Each turret carries three guns, so mounted that they can be pointed in any direction within the range of a half circle. One turret of each pair is placed back of and above the other. By this arrangement all the 14-inch guns can be fired at once. The end-on fire includes six 14-inch guns, and the broadside employs the twelve guns.

The light armor consists of twenty-two 5-inch guns for defense against torpedo boats, and two air-craft guns for use against aëroplanes. In addition to the guns there are four 21-inch torpedo tubes. The *Arizona's* personnel consists of about 1,200 officers and men.

The big guns of the *Arizona* will throw a 1400-pound projectile about twelve miles, and since these guns can be fired twice a minute, an enemy exposed to its broadside fire would be in position to be hit by 33,600 pounds of metal a minute. The velocity of these projectiles when they leave the muzzle is 2,100 feet per second, and their striking force enables them to penetrate most of the armor of modern battleships. The guns in each battery are so mounted that they can be aimed and fired by a single officer.

The accuracy with which these guns can be sighted was demonstrated by the gun crew of the *Pennsylvania,* a sister ship of the *Arizona,* during target practice in 1916. This crew scored five hits out of a broadside of twelve guns, aimed at an invisible target eleven miles distant.

Four battleships under construction or authorized in 1917 are a little larger than the *Arizona,* having a displacement of 32,000 tons. Their armor plate is thicker and they will carry twelve 16-inch guns capable of throwing 2700-pound projectiles twelve miles. They are to be driven by electric power, which has been adopted for all future battleships.

**The Pre-Dreadnaught.** The pre-dreadnaught, or battleship cruiser, differs from the dreadnaught, or battleship of the first class, in being longer and in being protected with much lighter armor plate. In these ships protection is sacrificed for speed, and the most efficient of them have a speed of forty miles an hour. Their heavy armament consists of 14-inch guns, and they can deal effective blows. They are, however, easily sunk, and their safety in battle lies in their ability to escape from the heavier ships. The naval battles in the War of the Nations proved the value of the pre-dreadnaught as an auxiliary battleship, and it is rapidly replacing the armored cruisers in all navies.

**Other Ships.** Coast-defense ships consist of gunboats and ironclad vessels of the *Monitor* type (see MONITOR AND MERRIMAC). They are not seagoing ships, and they have only local use. They would be utterly defenseless against a modern battleship. The submarine and torpedo boat are described under their respective titles. The former was developed to a most marvelous degree by the Germans in the War of the Nations.

*The Submarine Chaser.* The havoc wrought by the submarine after the outbreak of the War of the Nations set naval architects to devising a boat that would destroy this menace to shipping, and a number of types were constructed. The general name applied to all craft of this type is *submarine chaser.* The essentials of the submarine chaser are speed, light draft and mobility. The boats vary in length from forty-five to 125 feet, and the draft does not exceed four feet six inches. Those of the larger size have engines of 600 horse power, and a speed of thirty-five to forty miles an hour is attainable. The armament consists of one or more 3-inch guns and from one to three machine guns. Because of its light draft such a boat cannot be struck by a torpedo, and its 3-inch gun throws a shot that will pierce the shell of any submarine. Its speed and ability to change direction quickly renders it comparatively safe from the guns of its enemy; consequently, it is an antagonist that the submarine does not care to encounter. In 1917 boats of this type did effective work in assisting Great Britain in fighting German submarines.

## *History of Warships*

**Early Period.** Warships were in use centuries before the invention of gunpowder. The Egyptians had their war galleys, which were merely large rowboats, whose oarsmen were assisted by a sail when the wind was favorable. The navy of the ancient Greeks consisted of galleys similar to those formerly used by the Egyptians, but they were larger and were propelled by a large number of oars arranged in rows one above the other. The rowers sat on benches or banks, and there were usually two men to each oar. The largest of these ships had three banks of oars and were called *triremes.* These galleys were good coast-defense ships, but they were unseaworthy and practically useless for long voyages; yet it was with ships of this sort that the Greeks won the great Battle of Salamis (see SALAMIS).

The largest Roman galleys had three masts, to which sails were affixed when the wind was forcible. The Romans improved their warships until the Roman fleet drove from the Mediterranean the fleets of all other nations. Shields fastened together side by side, or strips of felt, hides and leather constituted the protected armor, and against the weapons of that day they were fully as effective as is the steel armor now in use. Stones and other missiles thrown by the catapult (which see), darts, javelins and fire were the weapons employed, and most of the fighting consisted in hand-to-hand encounters between crews of hostile ships when they were brought together.

The peoples of Northern Europe—the Saxons, Angles, Danes and Northmen—constructed ships of a different pattern and were able to navigate the open sea. Though not so large as the Roman galley, these Viking ships were much more seaworthy. They employed both oars and sails, but their seamen had no more effective weapons of warfare than did the Romans.

**The Middle Period.** The introduction of gunpowder and the use of cannon revolutionized the construction of warships. Larger and stronger ships became necessary. During the fifteenth century the Portuguese discovered the water route to India and Columbus found the New World. In this century the foundations for the Spanish Armada and of the British navy were laid. Henry VII built the *Great Harry,* the first large British warship, and Henry VIII formed a fleet of such ships. While they were an advance upon anything before attempted, these ships were clumsy affairs and exceedingly top-heavy. In 1637 the

*Sovereign of the Seas,* the first three-decker, or ship-of-the-line, was completed. For nearly two centuries this was the standard type of warship of the British navy. The *Victory,* Nelson's flagship at Trafalgar (which see), was one of the most famous of ships of this pattern.

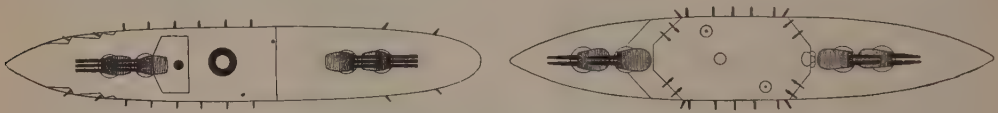
The warships of other nations were practically of the same pattern as those of England.

**The United States.** The United States had only a few small warships during the Revolutionary War. Its navy first attracted notice in the service it rendered the world in subduing the pirates of the Barbary states. Previous to the introduction of ironclads the frigate was the type of ship that made the United States navy respected throughout the world. It was built of wood, and the only change in pattern was such as became necessary to adapt the ship to steam propulsion. The introduction of steam led to the construction of steam gunboats and mortar boats, which were first used in the Crimean War.

**Ironclad Warships.** Many attempts to protect warships had been made previous to the War of Secession, but no practical advantage seems to have been gained. In 1862 the duel between the *Monitor* and the *Merrimac* in Hampton Roads turned the tide in favor of the ironclad, or armored, ship. This battle was another epoch-making event in the naval history of the world, although in 1858 the French began the construction of an armored frigate of the first class.

TYPES OF BRITISH AND GERMAN ARMAMENT

At left, British dreadnaught type of battleship, with thirty-eight guns, twenty of them being 12-inch. At right, a German dreadnaught, with forty guns. Twelve of these are 12.2-inch, eighteen are 6-inch, and the remainder relatively small.



TWO ARMAMENTS IN THE AMERICAN NAVY

At left, the battleship *Arizona,* with thirty-two guns, twelve of which are 14-inch monsters. At right, an older ship, the *Michigan,* with thirty guns, eight of which are 12-inch.

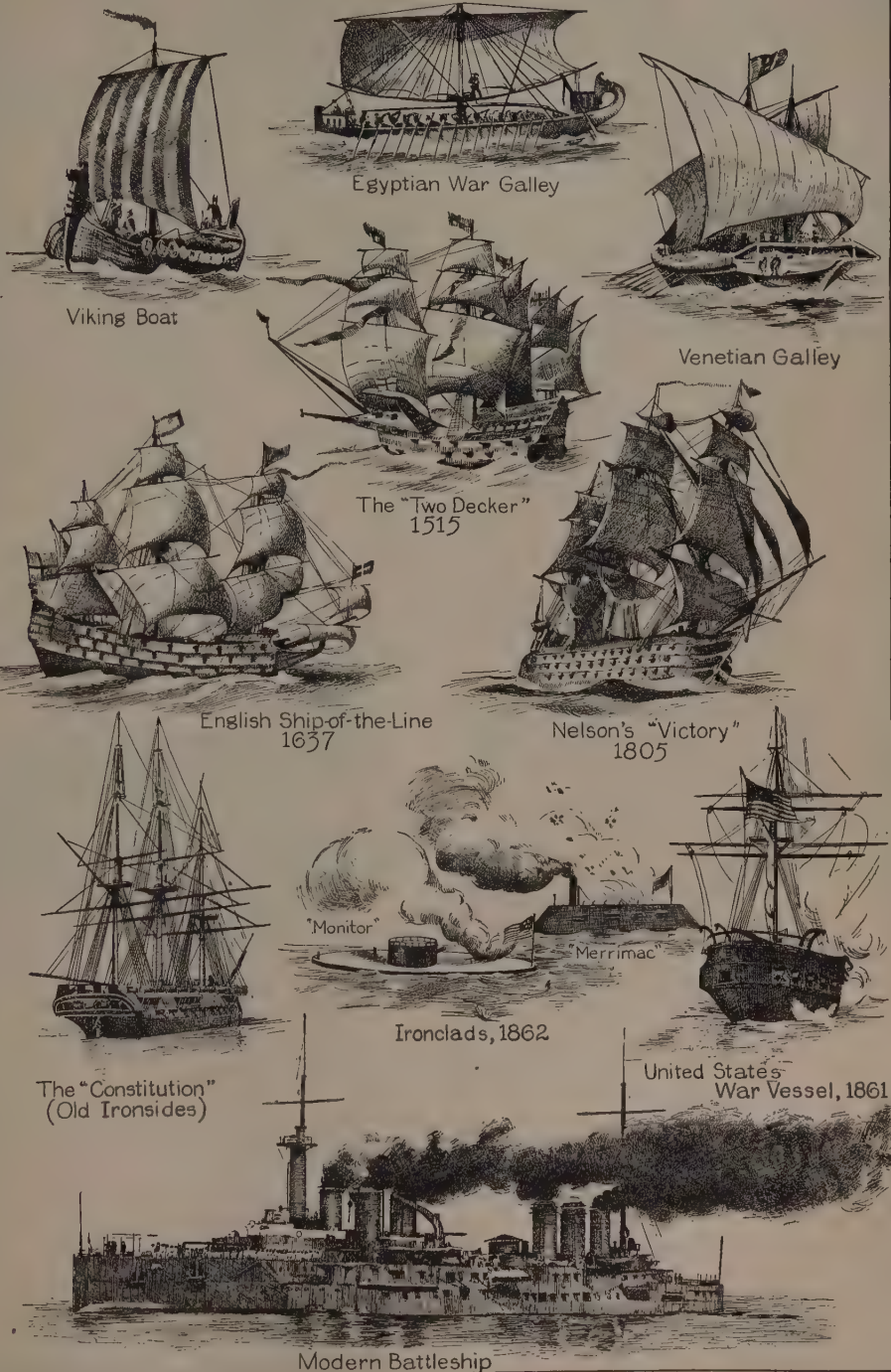
with ships of this type that the sea fights of the War of 1812 were won. These ships carried from forty to fifty guns. They were fast sailers and quick to obey the helm, and they had a decided advantage over the heavier and less easily managed ships of European nations.

**Use of Steam.** The use of steam as a motive power for warships was attempted soon after the invention of the steamboat. However, but little progress was made until after the invention of the screw propeller, because in the side-wheeler both engine and paddle wheel were so exposed that a single shot from the enemy might render the ship useless. The invention of the screw propeller, therefore, was the means of revolutionizing naval warfare throughout the world. The first successful steam warship was the *Napoleon* of the French navy, completed in 1849. It carried 100 guns and had engines of 600 horse power. Within a few years all the great navies had transformed their ships into steam warships. All men-of-war were still

In 1861 the United States built a number of gunboats for use on the Mississippi. Previous to their construction all armored ships had been of the same type as the wooden ships. The Mississippi gunboats were constructed on an entirely different plan, and from their shape were known as *turtlebacks.* Then the *Monitor* with its revolving turret appeared, proving that an entirely different pattern of armored ship was possible. No further advancement, however, occurred during the War of Secession.

*Armor Plate.* The big gun led to the protection of warships by metal plates. As guns increased in size and power, the demand for such protection became more and more imperative, and with the introduction of shell fire the old-style wooden warship became useless in the line of battle. The first plate used was four and one-half and four and three-fourths inches thick. This was laid over oak sides, usually twenty-six inches in thickness. Within a short time, however, guns were made with sufficient

# BATTLESHIP DEVELOPMENT



power to penetrate this armor, and from the beginning of the construction of armored ships to the present time there has been a race between armor plate and the big gun. The big gun has won in this competition because a 16-inch gun can throw a projectile that will pierce the toughest 15-inch armor plate that can be made. This condition has led to the building of pre-dreadnaughts having a speed that will enable them to keep out of range of the heavy-armed battleships.

The first plate used was of wrought iron. Later steel was substituted, and various methods for increasing the resistance of steel armor plate have been employed. The two armor plates now in use are those made of nickel steel and those made of Harveyized steel. The former consists of steel to which a small percentage of nickel has been added. The nickel toughens the steel and increases its resistance. Harveyized steel takes its name from the inventor of the process of hardening it. The process consists in placing the plate on the floor of a furnace and covering the surface with a layer of charcoal, over which a layer of sand is placed. The layer of sand is covered with fire brick. The temperature of the furnace is then raised to near the melting point of cast iron and kept at this point for several days. The carbon is burned into the steel and hardens it. When removed from the furnace the plate is allowed to cool slowly until it reaches a cherry red, when it is cooled quickly in running water.

**Recent Progress.** Since the construction of the first dreadnaught in 1905, progress has been chiefly along the line of improving the armament. The heavy guns of the first dreadnaught were so placed that only a part of them could be used in a broadside, as can be seen from the diagram. The first dreadnaughts of the German navy also followed this plan. It was left for the United States to perfect a plan for placing the heavy guns of ships of the dreadnaught type, which has since been adopted by all other nations. This plan consists in placing all batteries of heavy armament on the median line of the ship, and was first employed in the *Michigan* in 1906. Comparison of the diagram of the *Michigan* with that of the *Arizona* shows that the difference consists only in the number of guns to a turret. C.H.H.

**Related Subjects.** In this connection the reader may refer to the following articles in these volumes:

Constitution, The
Frigate
Galley
Gunboat
Navy (with list)
Ship
Submarine
Torpedo
War of the Nations

**WART,** a growth caused by the thickening and hardening of layers of skin over a small area. Warts usually occur on the fingers or hands, and are the result of some form of irritation; there may be one or several, but the tendency is for several to form. Occasionally small blood vessels grow up into a wart, but it is usually dry and hard. People who are obliged to use the hands in doing hard and dirty work are most frequently the victims of these disagreeable growths. The standard form of treatment consists in cutting off the wart close to the skin and then burning the base with an acid. Strong nitric acid applied persistently to the wart will destroy it, but this acid must be used very carefully and be applied only to the wart, as it destroys by burning or cauterizing. No matter how removed, warts have a tendency to return. As cancers sometimes develop from these growths, any wart which is sore and difficult to remove should be treated by a physician. C.B.B.

**WART HOG,** a species of swine of extremely ugly appearance. Its home is mainly in South Africa, and it is called *vlakte-vark,* or "pig of the plains," by the Dutch farmers. It is about three feet in height, and has huge tusks and

THE WART HOG

three wartlike protuberances on each side of the face. The skin is smooth and of a whitish-gray color, except upon the neck and back, where there is a long, coarse mane of dark, bristly hair. The wart hogs run in small family parties, and go far afield for their supplies of food, doing great damage to crops in cultivated districts. The young and tender specimens are fairly good food. A northern species, called *Aelian's* wart hog, is found in Abyssinia and Somaliland.

**WARWICK,** R. I., a town in Kent County, composed of several villages, all of which are summer resorts. It is situated in the central part of the state, on Narragansett Bay, where the waters of the Pawtucket and Providence rivers meet. Providence is twelve miles north, and Boston is fifty-two miles northeast, by way of the New York, New Haven & Hartford Railroad; electric lines radiate from the city. The largest industrial establishments are cotton-print factories, machine shops and foundries. The town hall, built in 1894, and Saint Joseph's Hospital, are the principal buildings. Each of the villages has a graded school, and there are several libraries.

Warwick was settled in 1642 as Shawomet; the name was changed to the present one in 1648, in honor of Robert, earl of Warwick, who granted the city charter. Warwick was the birthplace of General Nathanael Greene, an American Revolutionary leader. An interesting feature of the locality is the vast estate and former home of Senator Nelson W. Aldrich. Rocky Point, on the shore, is a noted seaside resort. In 1910 the population was 26,629; in 1916, 29,969 (Federal estimate). J.T.L.

**WAR'WICK,** Richard Neville, Earl of (1428-1471), a famous English soldier and statesman, commonly called the "king-maker." He was the son of Richard Neville, earl of Salisbury, and was made earl of Warwick after his marriage with Anne, daughter and heiress of Richard Beauchamp, earl of Warwick. From 1453 until his death he was the most prominent figure in English history, and the fortunes of Yorkists and Lancastrians during the Wars of the Roses were frequently determined by him. In behalf of his uncle, the duke of York, he took part in the Battle of Saint Albans in 1454, and it was chiefly owing to him that that battle ended in a Yorkist victory. As a reward for this service he was made governor of Calais.

War broke out again in 1460 between the two factions, and Warwick won the Battle of Northampton and captured King Henry VI; but later in the year the Yorkists were defeated at Wakefield, and the duke of York was put to death, Warwick becoming head of the Yorkist party as guardian of his cousin Edward. He lost the second battle of Saint Albans in 1461, but succeeded in proclaiming Edward, duke of York, king, and in having him crowned after a victory at Towton. Warwick held the highest offices, but the new king had begun to feel that the Nevilles were too powerful, and he dispatched Warwick on various diplomatic missions just to get him out of the country. By 1469 there was an open breach between them, and in the next year Warwick became reconciled to Margaret, queen of Henry VI; he landed in England with an army, forced Edward to flee, and replaced the imbecile Henry VI on the throne. In 1471, however, Edward met Warwick at Barnet with an army and the "king-maker" was defeated and slain. Warwick is the title character in Bulwer-Lytton's *Last of the Barons.*

**WASATCH,** *waw'satch,* **MOUNTAINS,** a range in the western part of the United States, noted for the rugged grandeur of its scenery. It is a part of the Rocky Mountains system, and extends from the borders of Idaho, through Central Utah and nearly to the Colorado River, forming the eastern wall of the Great Basin. The general elevation is about 10,000 feet, but the highest peak, Mount Belknap, reaches 12,200 feet. Dense pine forests cover the middle slopes and the summits are perpetually covered with snow. Many canyons and gorges are worn in the mountains by the numerous streams which rise on the slopes and afford irrigation for that territory. Coal, iron ore and silver constitute the mineral wealth of this range.

**WAS'CO,** a North American tribe of Chinookan Indians, who inhabited the region in the vicinity of the Dalles, Oregon. They now reside in the Warmspring Reservation, in Oregon, and they number less than 300. The Wasco Indians devoted themselves chiefly to fishing.

**WASH'BURN COLLEGE,** a coeducational institution located at Topeka, Kan., on a campus of 160 acres. It was founded in 1865 by an association of Kansas Congregationalists, but is now under independent control. The institution is organized into the college of liberal arts, the school of fine arts, a Bible school, departments of law and of engineering and an academy. Students are admitted by examination or through certificates from approved high schools. The degree of M.A. is granted for a year's post-graduate work. The college has a library of 25,000 volumes. The faculty numbers about sixty, and there were over 800 students in 1917.

**WASH'BURNE,** Elihu Benjamin (1816-1887), an American Congressman, Secretary of State and minister to France, who was called the "Watchdog of the Treasury" because he opposed corrupt legislation and refused to waste the people's money. He was born at Livermore, Maine, and was educated at Harvard College. In 1840 he was admitted to the bar and began law practice in Galena, Ill. From

1852 to 1869 he served continually in Congress, becoming a friend and supporter of General Grant, who appointed him Secretary of State in his first Cabinet. This position Washburne soon resigned in order to become minister to France. Throughout the Franco-German War he remained at his post in Paris, exhibiting remarkable diplomatic ability during the period of the Paris Commune in 1871, and winning honor for his country and the gratitude of European governments. He resigned as minister in 1877.

**WASH'INGTON,** the most northwesterly state of the American Union. It is the leading lumber state, and because of its extensive pine forests it is popularly known as the EVERGREEN STATE. As in West Virginia, the rhododendron, which grows luxuriantly on the mountain slopes, has been chosen as the state flower.

**Location and Size.** Washington lies on the Canadian frontier, the forty-ninth parallel forming the boundary with British Columbia; the straits of Georgia and Juan de Fuca are between the state and the Canadian island of Vancouver. The greater part of the southern boundary with Oregon is formed by the mighty Columbia; the Pacific Ocean washes its western shores, and to the east is the northern projection of Idaho.

Having an area of 69,127 square miles, of which 2,291 square miles are water, Washington ranks nineteenth in size among the states of the Union. It contains a little more than twice the area included in Maine, which occupies a corresponding position at the northeastern extremity of the United States, but is less than a fifth of the size of British Columbia.

**The People.** Since its admission into the Union in 1889, the state's growth in population has been remarkable. In 1910 the population was 1,141,990, and there were 17.1 inhabitants to the square mile; this was a greater average than that of any other coast or Rocky Mountains state and exceeded that in most of the states west of the Mississippi River. The increase in population between the census reports of 1900 and 1910 was 120.4 per cent, as compared to twenty-one per cent for the United States as a whole. On January 1, 1917, it was estimated that there were 1,565,810 inhabitants.

Of the foreign born, the English-Canadians are the most numerous, and there are many immigrants from Sweden, Germany, Norway, England, Italy, Austria, Russia and Ireland. There are over 12,900 Japanese, 2,000 Chinese and 6,000 negroes, who are employed chiefly as laborers or are in domestic service. About 10,900 Indians on the state reservations are included in the total population.

Over half of the total number of inhabitants live in towns or cities with a population of 2,500 or more. The three great cities of the state, Seattle, with nearly 350,000 inhabitants, Spokane, with more than 150,000, and Tacoma, with nearly 115,000 (all Federal estimates), contain more than one-third of the entire population. Other important cities are Olympia, the capital; Bellingham, Walla Walla and Everett.

Among the religious bodies the Roman Catholic, Methodist, Lutheran, Baptist, Disciples of Christ, Congregational and Episcopal denominations have the largest number of adherents.

**Education.** The school system is administered by the state superintendent of public instruction and a state board of education. The state is divided into school districts, which must maintain grade schools for at least three months of the year and a four-year accredited high school. Education has been compulsory in Washington since it was organized as a territory, and all between the ages of eight and fifteen years and those between fifteen and sixteen who are not employed are required to attend school. The illiteracy among the native whites averages only three-tenths of one per cent, but the large number of foreign-born inhabitants who cannot read or write increases the total average for the state to two per cent.

The educational fund is derived from state taxation, the income from public lands and from state appropriations. The state maintains normal schools at Cheney, Ellensburg and Bellingham; a state college, which includes an agricultural college and experiment station and a school of science and mechanical arts, at Pullman; and the state university, which embraces departments of liberal arts, law, pharmacy, engineering, mines and forestry, at Seattle.

**Institutions of Charity and Correction.** The charitable institutions of the state are under the management of a state board of control consisting of three members, one being appointed every two years by the governor. This board, together with the superintendent of the penitentiary, constitutes the prison board. The state institutions include hospitals for the insane at Fort Steilacoom, Medical Lake and Sedro Woolley; a home for the feeble-minded near Medical Lake; schools for the deaf and blind at Vancouver; a soldiers' home at Orting and a veterans' home at Port Orchard; a reformatory at Monroe; a training school at Chehalis, and the penitentiary at Walla Walla.

**The Land.** The state is divided by the Cascade Mountains into two unequal sections differing widely in surface, climate and industry. Western Washington, the smaller section, is penetrated from the north for over 100 miles by Puget Sound, which with its deep inlets and bays forms one of the finest harbor systems in the world. Its basin extends south between the Cascades and the Coast Range, continuing in Oregon as the Willamette Valley, and it is the richest and most densely-populated section in Washington. The fertile, rolling fields of this valley merge into the wooded foothills of the Coast Range on the west. These broad mountain masses, covered with thick forests, in the south rarely exceed 2,000 feet in altitude, but in the north they rise to the lofty, rugged peaks known as the Olympic Mountains. Their precipitous slopes, deep gorges and dense pine forests make the region almost inaccessible.

The Pacific coast is regular, the only large inlets being the landlocked bays of Gray's Harbor, Willapa Bay and the mouth of the Columbia, half of which belongs to Washington.

The Cascade Range, nearly 100 miles in width, is a region of grassy plateaus, towering peaks and deep canyons. In the south-central region, misty Mount Rainier lifts its crown of snow 14,363 feet above the sea, and near by Mount Adams rises 12,470 feet and Mount Saint Helens 10,000 feet. In the northern end of the range, Mount Baker, with an elevation of 10,837 feet, is the highest peak.

The western slopes of these mountains receive the moist sea winds and are covered with magnificent forests, but the eastern slopes are more open; beyond them, occupying the southern half of Eastern Washington, there is an undulating, treeless, fertile plain lying 1,000 feet above the sea. In the extreme southeast corner of the state the Blue Mountains rise above the high plain. On the north the grassy plateau is separated by the deep canyons of the Columbia and Snake rivers from the Okanogan highlands, a region of low, rounded mountains extending from the Cascades to Idaho.

**Rivers and Lakes.** The Columbia, the great river of the Northwest, enters the northeast corner of Washington from British Columbia, and making a great curve known as the "Big Bend" flows through the eastern half of the state for over 400 miles. Near the southern boundary it is joined by its largest tributary, the Snake River, and after making another sharp bend flows west along the southern boundary of the state and empties into the Pacific. It cuts a deep gorge through the Cascades, the scenic grandeur of which is almost unrivaled (see OREGON, subhead *Scenery*). With its tributaries, it drains the Okanogan highlands, the east slopes of the Cascades, the eastern plain, the Columbia plain and the southern part of the Puget Sound basin.

Western Washington is drained by the Skagit and the Nisqually rivers and many small streams flowing into Puget Sound; by the Chehalis, which cuts through the Coast Range and empties into the Pacific at Gray's Harbor; and by the Cowlitz, a tributary of the Columbia.

Deeply embosomed in the Cascade Mountains, there are many beautiful, narrow lakes, the largest of which, Lake Chelan, stretches fifty miles between cliffs on the eastern slope.

**Climate.** Washed by the waters of the Japanese Current of the Pacific and tempered by the balmy Chinook wind, Western Washington has a mild and equable climate, resembling that of Northern England. The summers are cool, and the winters are so mild that flowers bloom every month in the year. The moisture-bearing winds from the ocean are chilled against the Cascade Mountains and cause a heavy rainfall in the western section. Occasionally along the coast the annual precipitation is 150 inches, which is an amount exceeded in few other parts of the world.

Much of Eastern Washington is semiarid, and except on the higher mountain slopes and in the southeastern plain agriculture is impossible without irrigation. The annual average rainfall is sixteen inches. The summers are hot, and the winters, though short, are severe. There are few cloudy days, and the air is remarkably clear.

**Agriculture.** The moist, rich soil of Western Washington is specially adapted to the growing of grasses, oats, fruits, vegetables and hops, and irrigating systems. There are many private canals fed by smaller rivers and mountain streams; there are over 334,000 acres of irrigated land in the state.

The greatest recent agricultural development has been in fruit culture, and Washington is becoming one of the Union's leading fruit-growing states. There are thousands of orchards in the irrigated valleys east of the Cascades, and their number is steadily increasing; small fruits are raised extensively in Western

OUTLINE MAP OF WASHINGTON

Showing boundaries, navigable rivers, chief cities, mining centers and the highest point of land in the state.

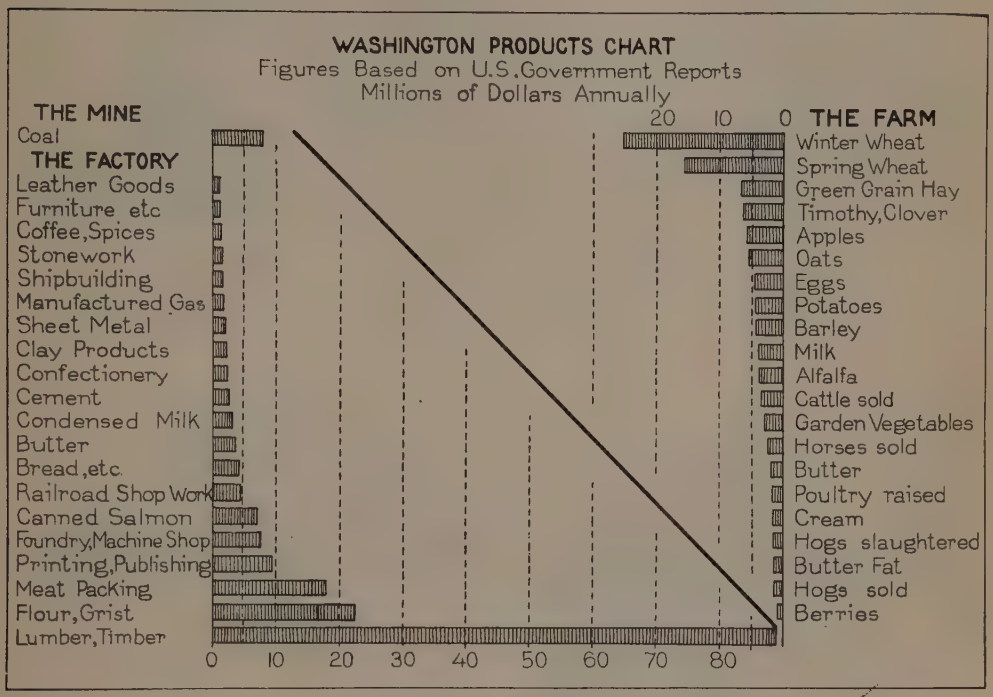
in the fertile eastern plain great crops of hay and wheat are raised. Whitman County, on the eastern border of the state, where irrigation is not necessary, in 1910 ranked fourth among all counties in the United States in the value of farm crops. Its chief product was wheat, which is also the leading crop of the state, its annual value exceeding $40,000,000. Hay is the next crop in importance, and including the native green grasses, timothy and clover and alfalfa, its annual value exceeds $15,000,000. Oats rank third among the state's cereal crops, followed by barley, which is raised extensively in the Columbia plain. The Yakima project, watering over 140,000 acres, and the Okanogan project, including 10,000 acres, are the principal Washington, and grapes are grown on the mountain slopes. The annual apple crop exceeds 2,600,000 bushels, valued at about $5,900,000, and ranks third in value among the crops of the state. Plums and prunes, peaches and cherries are also grown with much success.

**Live Stock.** The grassy plateaus in the Cascades are the summer pastures of large herds of cattle and sheep, and the mild winters and rich grasslands of Western Washington make stock raising and dairying important in that section. The state stock farms and creameries largely supply the home markets.

**Forests.** About seventy per cent of the total area of the state, or 47,000 square miles, is woodland. The finest forests of Douglas fir and

white and yellow pine are west of the Cascades and in the Okanogan highlands. Red fir, bull pine, yellow pine and tamarack grow on the eastern slopes of the Cascades, but are inferior to the timber of Western Washington. There are large forest reserves in the national parks, and at the present rate of consumption it is estimated that the state timber will supply the local mills for about 100 years.

The lumber industry has developed in Washington since 1880; in 1900 the state ranked fifth among the lumber-producing states, and since 1905 it has held first place.




**Fisheries.** The salmon fisheries of Puget Sound, the Columbia River, Gray's Harbor and Willapa Bay constitute one of the leading industries of the state. Producing annually more than 54,000,000 pounds of salmon, Washington furnishes five-ninths of the total output of the United States, excluding Alaska, and over twice as much as Oregon, which ranks second. State hatcheries have been established and have increased the supply. Halibut, cod, mackerel and herring are also caught in the coast waters; clams, crabs and shrimp are abundant, and there are extensive oyster beds in Puget Sound and in Willapa Bay. Large quantities of game fish are caught in the fresh-water lakes and streams. In the value of all fisheries' products, Washington ranks fourth among the states, the products of Massachusetts, Virginia and New York being of greater value.

**Minerals.** Washington has the only large coal deposits in the Pacific states, and it furnishes a large part of the supply of the western coast. The coal fields occupy extensive areas in the Puget Sound basin, and have an estimated available supply of over sixty billion tons. Although the annual production still averages over 3,000,000 tons, the increasing output of petroleum in California has caused a decrease in the production of coal in Washington by lessening the demand for coal as fuel.

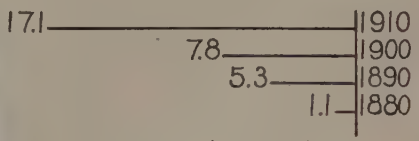
Gold and silver are mined in the counties on both sides of the Cascades and in the Okanogan highlands. There are deposits of iron in the Puget Sound basin, and copper and lead are found in the ores containing the precious metals. Marble, granite, limestone, sandstone, talc and asbestos are among the valuable mineral resources of the state.

**Manufactures.** The abundant supply of fuel and the power furnished by the mountain streams of Western Washington have contributed to the rapid growth of the manufacturing industries. The milling of lumber and the manufacture of timber products constitute by far the leading industry. The state manufac-

# WASHINGTON

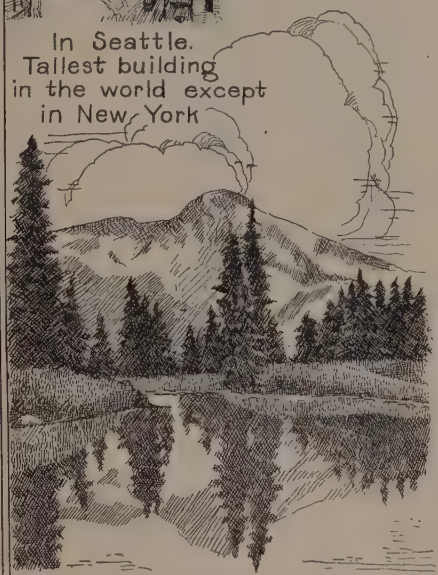
In Seattle.
Tallest building
in the world except
in New York

Religions




Increase in Population
Per Sq. Mi. by Decades

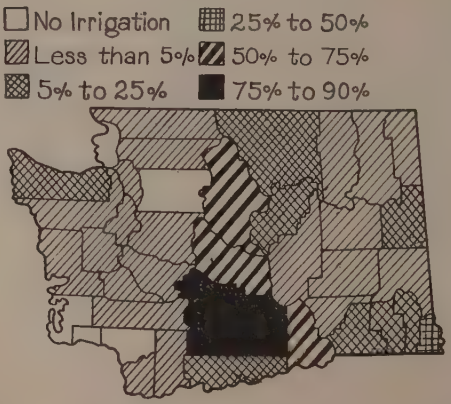
Monument to
Marcus Whitman,
Walla Walla



Mount Rainier reflected
in Mirror Lake

Administration Building,
University of Washington,
Seattle

Congressional
Districts




Irrigation Map

tures three-fifths of the shingles made in the United States, and doors, sash and furniture are other important products. The largest mills and factories are located in the western forests and in the Puget Sound basin. The annual value of the lumber and timber products is about $90,000,000, and exceeds that of any other state.

Flour and grist mill products are second in value and are largely exported to Oriental markets. Meat packing, printing and publishing, foundry and machine-shop work, the canning of salmon and railroad-shop work are other leading industries, and the manufacture of bread and bakery products, butter and condensed milk, cement, clay products, sheet metal and stonework are also important. There are large shipyards at Seattle, Tacoma and other points on Puget Sound, the Washington timber being especially adapted for shipbuilding. Steel vessels are also constructed. Seattle is the leading manufacturing center.

**Transportation and Commerce.** Though Washington was the last political division of the United States to be entered by railroads, there are now over 8,800 miles of railroad in the state. Three transcontinental lines cross the state from east to west, and the great centers of trade on Puget Sound are connected with the larger cities and towns in the state and with cities in British Columbia. The lines of longest mileage are the Northern Pacific, the Great Northern, the Oregon & Washington, and the Chicago, Milwaukee & Saint Paul. About 11.5 per cent, or 4,250 miles, of public road are surfaced.

The Columbia is navigable along the southern boundary, and the Snake River may be navigated 180 miles above its junction with the Columbia. These rivers and their various branches constitute an important factor in the transportation problem of the state.

Seattle and Tacoma, both on Puget Sound, possess the chief harbors of the state, and are among the four leading ports on the Pacific. There is an extensive trade with Alaska, Hawaii and the Philippine Islands. Gray's Harbor is important in the shipment of lumber.

## *Government and History*

**Government.** The present constitution was adopted in 1889. Suffrage is extended to both men and women who can read and speak the English language and who have lived in the state one year, in the county ninety days and in the precinct thirty days. Untaxed Indians, convicts, insane and feeble-minded persons are debarred from suffrage by an original provision of the constitution.

The *executive department* consists of a governor, lieutenant-governor, secretary of state, treasurer, auditor, attorney-general, superintendent of public instruction and commissioner of public lands, all of whom are elected for four years.

The *legislature* consists of a senate and a house of representatives, and meets biennially. Members of the house of representatives are elected every two years and may not exceed ninety-nine nor be fewer than sixty-three in number. Senators are elected for four years, and their number must not exceed one-half nor be less than one-third of the number of members in the house of representatives.

The *judicial department* consists of a supreme court of nine judges, elected for six years, and a superior court in each county, presided over by one judge, elected for four years.

Local government is by counties. Cities of 2,500 to 20,000 may adopt the commission form of government. The initiative and referendum are in force, but do not apply to constitutional amendments. Statewide prohibition has existed since January, 1916.

**History.** The exploration of the Columbia River in 1792 by Captain Gray in the American ship *Columbia,* gave the United States claim to the territory which it drained. Subsequently the river and coast were visited by many explorers, and the first United States naval expedition ever sent out by the government was for the purpose of exploring Puget Sound. The most notable exploration of the interior of the present state was made by Lewis and Clark, who in 1805 descended the Snake River to the Columbia and followed the Columbia from that point to the Pacific. The early history of Washington is the story of the settlement of Oregon, of which it was a part (see OREGON).

In 1853 Washington was separated from Oregon and was organized as a territory. The great influx of settlers who were attracted at this time by the discovery of gold in the territory was followed in 1855 by an uprising of the Indians and an attempt to massacre the white population in what is known as the Washington-Oregon War.

# *RESEARCH QUESTIONS ON WASHINGTON*

**(An Outline suitable for Washington will be found with the article "State.")**

What was meant by "fifty-four forty or fight," and what part did the slogan play in the history of this region?

What is the most densely populated section of Washington? What has made it so?

What is the railway mileage to each hundred square miles of area? How does the state compare in this respect with the states upon which it borders?

Make the same comparison between Washington and the two states which it most nearly resembles in size. (See table with article UNITED STATES.)

Under what condition do boys and girls between fifteen and sixteen years of age have to attend school in this state?

About what proportion of the total apple crop of the United States is produced in Washington? (See APPLE.)

Show the close connection between the manufacturing industries of Washington and its natural resources.

How many cities of the United States have a greater population than Washington's largest city? (See list on page 1393.)

How many are larger than Washington's second largest city?

How did Washington's banner agricultural county rank in 1910 among the counties of the United States?

What resources has this state which make possible its continued development as an industrial commonwealth? As a commercial?

What are the "weeping trees" of Washington?

About how many inhabitants has this state who do not belong to the Caucasian race? To what race or races do they belong?

Knowing something of the mountain ranges of this state, and remembering that the prevailing winds are from the west, how could you tell that the eastern section must be at least semiarid?

What important mineral product does Washington yield that no other state on the Pacific coast possesses?

What resource of another coast state has in a measure interfered with the mining of this product?

What was the chief obstacle to progress during the early years of the history of this territory?

How does this state compare in size with the other Pacific coast states? How does it compare in density of population?

How does it compare in density with the United States as a whole?

How did its percentage of growth during a recent decade compare with that of the country as a whole?

What factors combine to give Western Washington its remarkably mild and equable climate?

Of what important product does Washington furnish over half of all that is produced in the United States?

What was the "bait" that drew the earliest settlers to this region? With what opposition did they meet?

How many states of the American Union are larger? How many of these larger states have a greater population?

The early development of the territory was retarded by the lack of railway communication, but since the advent of railroads in 1884 the growth in population and the development of the natural resources have been almost unparalleled. Several vain attempts were made to secure statehood, but not until 1889 was an enabling act passed by Congress. A constitution was framed, and the state was admitted to the Union in November of the same year. In a quarter of a century Washington was transformed from a wilderness of forests to an important industrial and commercial commonwealth, and with its magnificent harbors and rich resources it is destined to become one of the Union's great commercial centers.

**Other Items of Interest.** In certain regions of Washington the firs condense the atmospheric moisture at times when no dew is observable elsewhere. Sometimes the water drips from the narrow leaves so copiously that the ground is almost soaked. The inhabitants call these firs "weeping trees."

At the village of Port Gamble, on Puget Sound, the sight-seer is shown the stump of a huge tree from which were cut the spars for the *Great Eastern,* for almost a half century the largest ship afloat.

Several of the highest mountains of the state have glaciers on their upper slopes.

A few deer and black bears still roam the forests and mountain goats are numerous in the Cascades, but for the most part the wild animals have been driven out.

The northern boundary line of what is now Washington caused much disturbance and was the subject of the "fifty-four forty or fight" controversy between the United States and Great Britain. In 1846 a treaty was negotiated which fixed the boundary line at 49°.

Several lines of steamers sail regularly from Washington ports to China and Japan and to Europe.

Most of the Indians live on the twelve reservations, which contain in all over 2,333,500 acres. A fairly large number, however, do not live on reservations, but are occupied in the logging camps or the fishing centers. E.B.P.

Consult Meany's *History of the State of Washington;* Schafer's *History of the Pacific North West.*

**Related Subjects.** The reader who wishes more information as to the geography and industries of Washington will find much that is of interest in the following articles:

| | |
|---|---|
| CITIES | |
| Aberdeen | Seattle |
| Bellingham | Spokane |
| Everett | Tacoma |
| Hoquiam | Vancouver |
| North Yakima | Walla Walla |
| Olympia | |
| LEADING PRODUCTS | |
| Apple | Salmon |
| Lumber | Shingles |
| Pine | Wheat |
| MOUNTAINS | |
| Cascade Range | Rainier, Mount |
| Coast Range | |
| RIVERS | |
| Columbia | Snake |

**WASH'INGTON,** the capital city of the United States, in 1917 the seventeenth in population among the cities of the American republic, and one of the most beautiful of the world's centers of government. It is located on the Potomac River, about a hundred miles from its mouth, and is thirty-eight miles and 135 miles southwest of Baltimore and Philadelphia, respectively. New York City is 228 miles northeast, and Atlanta is 648 miles southwest. The population in 1910 was 331,069; by 1916 it had increased to 363,980, according to a Federal estimate. More than one-fourth of the inhabitants belong to the African race.

Washington is coextensive with the District of Columbia, the whole consisting of a tract about seventy square miles in area, of which ten square miles are water (see map of District and city, page 1810). The Potomac, here nearly a mile wide, extends along the southwestern border of the city and is entered by the Anacostia River and Rock Creek. The city proper occupies the land between Rock Creek and the Anacostia, but the former town of Georgetown and various suburban districts, though called by distinctive names, are for all legal purposes a part of Washington. The land slopes gradually from the low Potomac shore, and surrounding hills rise to heights of 300 to 400 feet.

**General Description.** Unlike most American cities, the national capital has been built according to a systematic plan, conceived by the nation's first President and carried out by a French engineer, Pierre Charles L' Enfant. In a general way this scheme has been applied to both the city and the District. In 1902 an elaborate city improvement plan was inaugurated by the Senate Park Commission, consisting of architects Daniel H. Burnham, Charles F. McKim and Frederick Law Olmsted, and sculptor Augustus Saint Gaudens. As a result of their labors Washington has been greatly beautified and improved, and it can justly lay claim to being one of the most artistic municipalities in the country.

According to the original plan, the Capitol building is the center of the street system. Three streets, known as North Capitol, East Capitol and South Capitol, and the Mall radiate from it in straight lines and divide the city into four sections—designated as Northeast, Southeast, Northwest and Southwest. The Mall, an area occupied by parks, gardens and grounds of various buildings, stretches westward from the Capitol to the Washington Monument. Were East Capitol Street continued as West Capitol, it would extend through the center of the Mall. The names of the four city sections are usually abbreviated to read N. E., S. E., N. W. and S. W. Streets running due north and south in these districts are designated by numbers, and those which intersect them at right angles are named by letters. The exact location of a street is indicated by the section abbreviation, as D St., N. W., and K St., S. E. All of the houses in any one section have their own set of numbers, and there are one hundred numbers to a block, the series increasing as the numbers recede from a Capitol Street. Besides the numbered and lettered streets there are other thoroughfares which radiate from special centers and cross the straight streets diagonally. These are named for states of the Union, the central one for Pennsylvania, the "Keystone State."

Pennsylvania Avenue, the "backbone" of Washington, is a beautiful and spacious thoroughfare which has become the great parade ground of the city. It is four and one-half miles long, and extends in a northwesterly direction, but not continuously, for it is broken by the Capitol grounds and by those of the Treasury and the White House (see map). In various places where it is intersected by other streets it opens into beautiful open spaces and small parks. Washington's streets as a rule are wide, excellently paved and lined profusely with trees, and they are not surpassed in beauty and spaciousness by those of any other city in the country.

"FREEDOM"

This bronze statue, crowning the dome of the Capitol, stands nineteen feet six inches high and weighs 12,985 pounds. It was modeled by Crawford (see page 1626).

**Important Buildings.** From all parts of the city the most conspicuous object is the white dome of the Capitol, crowned by a colossal statue of *Freedom*. The building rests on a plateau about eighty-eight feet above the level of the Potomac, and faces the east. This impressive structure is almost the first object that greets the eye of the traveler as he emerges from the Union Station, a few blocks to the northeast, and it dominates that portion of the city. The present edifice is the result of a

series of building operations, beginning with the laying of the first corner stone in 1793, by Washington, and ending with the completion of the iron dome, in 1865. The House and Senate extensions, both of white marble, were completed after 1850. In all, $26,000,000 has been expended on the Capitol and its beautiful grounds.

The building is 751 feet long and 350 wide, and its dome is 287 feet, 5 inches above the base line of the east front. Stately columns and pilasters in the Corinthian style of architecture are its chief exterior adornments, and the eastern main entrance, where the Presidents are inaugurated, is magnificent. This, the grand central portico, has twenty-four columns and is 160 feet wide. It is flanked by two groups of colossal statuary, and in its center is a great bronze door designed by Randolph Rogers. The door panels are decorated in high relief, showing scenes in the life and career of Columbus. This door opens directly into a rotunda occupying almost the entire width of the central building, and rising upward to the top of the dome. The rotunda is embellished with many historical paintings, including the famous Revolutionary series by John Trumbull. On the canopy of the dome is the beautiful *Apotheosis of Washington,* painted by the Italian artist Constantino Brumidi. Through the northern door of the rotunda one passes to the Supreme Court Chamber and thence to the Senate Chamber, and through the southern door to Statuary Hall and the House of Representatives. Statuary Hall, formerly the meeting place of the Representatives, is now a repository of marble and bronze memorials of illustrious Americans, each state being represented by one or two. It is interesting to note that though the Capitol faces east, the city has, so to speak, grown up in its rear, for the N. W. section is by far the largest. The western face of the building, therefore, has been greatly improved and embellished, and the Capitol has really two fronts of almost equal beauty. Adjoining the Capitol grounds, on the north and south, respectively, are two imposing marble buildings containing the administrative offices of the Senate and the House of Representatives.

Rivaling the Capitol in point of interest is the official home of the President, popularly known as the White House. This homelike mansion and the beautiful grounds about it are described in detail in these volumes under the heading WHITE HOUSE. Another building which strangers in Washington enjoy visiting is the mammoth Treasury, at 15th Street and Pennsylvania Avenue, N. W. Unfortunately, the Treasury was erected on ground almost adjoining the White House Park, and it spoils what otherwise would have been a splendid view of the Executive Mansion, down Pennsylvania Avenue from the Capitol. The Treasury, a massive granite structure 466 feet long and 264 feet wide, is an example of Greek Ionic architecture. The building which houses the departments of State, War and the Navy is located west of the White House, at 17th Street and Pennsylvania Avenue. It is an adaptation of French Renaissance, and is an imposing structure covering four and one-half acres.

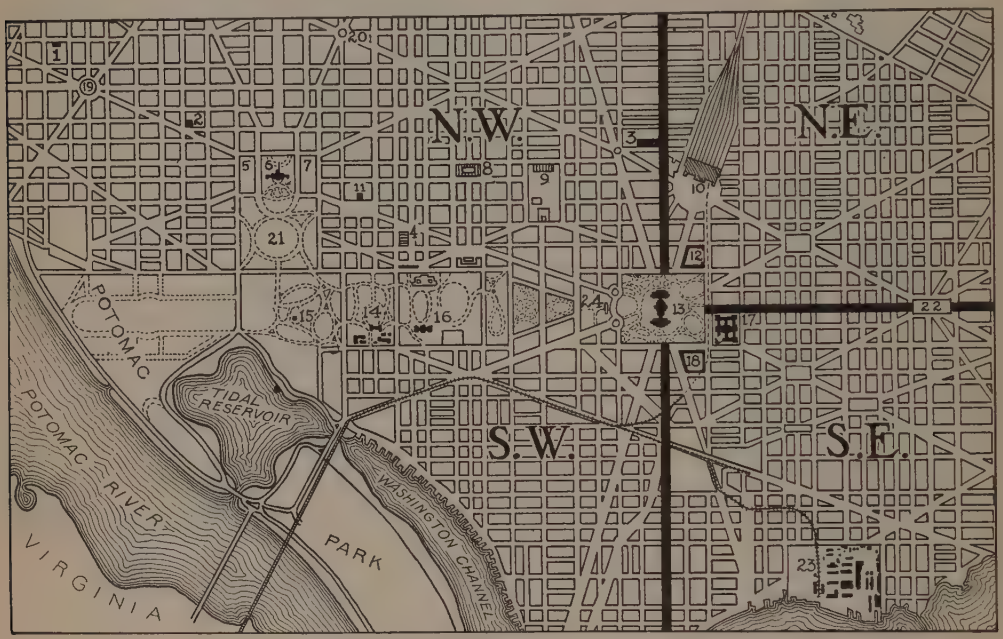
The Department of the Interior has its headquarters in the massive Patent Office at 7th and F streets, an example of Greek Doric. Across the street from it is the General Land Office, and on G Street are the buildings used by the Pension Bureau and the Government Printing Office. The most notable feature of the exterior of the Pension Building is an ornamental frieze in terra cotta, picturing scenes of the War of Secession. Among the newer government buildings is the home of the Department of Agriculture, an artistic white marble structure on the Mall, between 12th and 14th streets. The Mall contains also the buildings of the Smithsonian Institution, including the recently-completed structure which contains the collections of the National Museum (see illustration, page 4077). The latter, magnificently built of white marble, is a notable addition to the stately buildings in the Capitol district of the city.

Visitors also find much to interest them in various other buildings, though these have no special distinction as to architecture—the gun-shop and museum of the Navy Yard, on the bank of the tidal estuary of the Anacostia; the Marine Barracks, on 8th Street, S. E.; the Naval Observatory, north of Georgetown; and the building of the Fish Commission (6th and B streets, S. W.), with its marvelous aquariums. One who attempts to make a tour of the national buildings is impressed with the fact that they are widely scattered. As a matter of fact, the buildings were purposely erected at considerable distances apart to avoid overcrowding of street cars by government employees at rush hours.

Washington has many other buildings of beauty and interest. Its new Union Station, at the intersection of Massachusetts and Delaware

avenues, is one of the most artistic structures of its kind in the world. The designers aimed to make this depot a real portal of the capital, and it represents a harmonious blending of beauty, utility and spaciousness. It is built entirely of granite. At the main entrance there are six massive columns, and these are surmounted by statues eighteen feet in height; the two central ones represent Freedom and Imagination, and the others, Prometheus (fire), Thales (electricity), Ceres (agriculture) and Archimedes (mechanics). In front of the building stands a beautiful memorial fountain to Columbus. The District and city post office, adjacent to the Union Station, is another structure of great artistic beauty. It is built of white marble in the Corinthian style of architecture, and was completed in 1916.

The building of the Pan-American Union, at 17th and B streets, N. W., has been described by a great French architect as combining, in proportion to its cost, beauty of architecture and practical usefulness more than any other public building in the world. It represents a combination of classical and Spanish Renaissance styles (see illustration, page 4476). The cost of the building—$750,000—was defrayed by Andrew Carnegie; the grounds are valued at $250,000. Other notable edifices of the N. W. section are the white marble Municipal Building of the District of Columbia, at 14th Street and Pennsylvania Avenue, and the $1,000,000 Scottish Rite Temple, at 16th and S streets.




THE CENTER OF WASHINGTON

(1) Weather Bureau
(2) Department of Commerce and Census Bureau
(3) Government Printing Office
(4) Postoffice Department
(5) State, War and Navy Building
(6) White House (Executive Mansion)
(7) Department of the Treasury
(8) Department of the Interior and Patent Office
(9) Pension Office
(10) Union Station
(11) Department of Labor
(12) Senate Office Building
(13) Capitol
(14) Department of Agriculture
(15) Washington Monument
(16) Smithsonian Institution
(17) Library of Congress
(18) House Office Building
(19) Washington Circle
(20) Thomas Circle
(21) Executive Grounds
(22) Lincoln Square
(23) Navy Yard
(24) Botanical Garden

(For description, see page 6194).

The tallest structure in the city, Washington Monument, is described and illustrated in these volumes under its title.

**Parks.** Though space for large park areas was not mapped out in the original city plans, there are several thousand acres of parked land in Washington and the adjoining regions. The city is beautified by numerous open spaces at street intersections, and the grounds of the Union Station, the Capitol and other buildings are really beautiful parks on a small scale. Sixteen hundred acres of wild and romantic country in the Rock Creek Valley have been

set apart as Rock Creek Park, and adjoining this on the south is the delightful Zoölogical Park, of 169 acres. Potomac Park is an enclosure of 737 acres, made up of reclaimed land along the river. It is practically an extension of the Mall, which is itself a series of parks—Botanical Garden, Seaton Park, the grounds of the Smithsonian Institution and of the Agricultural Department, and Washington Monument Park. Four miles north of the Capitol there is a beautiful hilly tract of over 500 acres, containing the Soldiers' Home, and adjoining this on the south is McMillan Park, enclosing the filtration plant. Of its 118 acres, twelve are improved parking, thirty-eight are included in the new reservoir, and the remainder are devoted to the plant.

**Educational Institutions; Museums.** Washington has a number of high-grade institutions of advanced learning, notably the George Washington University, Georgetown University (Jesuit), the Catholic University of America, Howard University and the Columbian Institution for the Deaf and Dumb. It is also the seat of the Carnegie Institution (see page 1190). A Methodist institution—the American University—is of recent establishment, and reported a student enrolment of forty-five in 1916. A free school of art is maintained in connection with the Corcoran Art Gallery (which see). The priceless collections of this institution are housed in a beautiful building near the White House. Another valuable art collection is preserved in the new building of the National Museum, previously mentioned. This building is itself a combination of splendid museums, for in it are extensive collections representing a wide range of scientific research. There are other important collections in the various buildings of the Smithsonian Institution, and in many of the departmental buildings. In fact, Washington is an educational center of first rank, and the city offers the best possible facilities to the specialist.

**Libraries.** No other city of its size can compare with Washington in respect to collections of books. The Library of Congress, facing the east front of the Capitol, has the third largest collection in the world (see detailed description, page 3405) and the largest in the western hemisphere. The building itself, a splendid example of Italian Renaissance architecture, has by far the most artistic interior of any of the national buildings. One would need to spend days within the library to appreciate fully the surpassing beauty of its decorations. Of the various scientific collections of the government, of special merit are the medical library of the office of the Surgeon-General, and the collections of the Weather Bureau, the Agricultural Department, the Smithsonian Institution, the Geological Survey, the Bureau of Education and the Naval Observatory. Washington's public library collections are housed in a fine marble building on Mount Vernon Square, at the intersection of New York and Massachusetts avenues.

**Transportation and Industry.** All steam railroad trains enter the city by way of the Union Station. They are the Baltimore & Ohio, the Chesapeake & Ohio, the Pennsylvania, the Southern and the Washington South. Local transportation is amply taken care of by numerous electric lines, carriages and sightseeing automobiles. The Washington Railway & Electric Company operates thirteen different lines, providing transportation to many delightful spots in the country about Washington. Mount Vernon, the home of George Washington, is sixteen miles below Washington, on the right bank of the Potomac, and is easily reached by boat or by trolley cars. As an industrial city the national capital is only of secondary importance, the chief industrial establishments being manufactories of products for local consumption. The government departments, however, give employment to thousands.

**Government.** Three commissioners, appointed by the President and approved by the Senate, control the government of the city and District. Citizens are not permitted to vote in national elections or on local matters. Half of the money required for the support of the local government and municipal activities is appropriated by the United States, and half is raised by taxation of citizens within the District. The District is supplied by water brought from the Great Falls of the Potomac through an aqueduct twelve miles long, and the waterworks system is under government control.

**History.** The beautiful site on the Potomac occupied by the national capital was the choice of President Washington (see DISTRICT OF COLUMBIA, subhead *History*). The north section of the Capitol was completed in 1800, and Congress held its first session in the building in November of that year. As to the rest of the city something may be inferred from this extract from a letter of the period: "The Capitol is on an eminence near the center of the immense country called here the city. There is

## *Research Questions on Washington*

**(An Outline suitable for Washington will be found with the article "City.")**

How many cities in the United States have a greater population than Washington? How many in Canada?

How does it compare in number of inhabitants with the capital of Great Britain? of France? of Germany? of Canada?

Who chose the site of this city as the location for the Federal capital? Where was the capital during his administration?

On a train running forty miles an hour, how long would it take you to travel from Washington to New York? To Atlanta? To Philadelphia?

How much larger is the District of Columbia than the city of Washington?

Who designed the city, and who carried out the plans?

What does the address F Street, S. E. mean?

What is the "backbone" of Washington? Is it a continuous thoroughfare?

Of what nationality was the sculptor of the statue of *Freedom* which crowns the dome of the Capitol?

Who laid the first corner stone of the Capitol building?

When was the dome completed?

Describe the portico where the Presidents are inaugurated.

What painting occupies the canopy of the dome? Of what nationality was the artist?

When was the White House begun? What President first occupied it?

Why was it necessary at one time to rebuild the White House almost completely?

Why are not the government buildings massed in one section of the city?

What building is considered by a competent critic one of the best combinations of architectural usefulness and practical usefulness in the world?

Who paid for the construction of this building?

What is the tallest structure in the city? Where was it erected? Describe it.

What is the Mall? In what direction does it extend from the Capitol?

What right has the city to be considered an educational center of the first rank?

How many libraries in the world have more books than the Library of Congress?

How much larger are these greater libraries?

How many railways enter the city? Into how many stations do they run?

In what room are the great public receptions at the White House held?

In what room are the portraits of the Presidents?

Where is the home of George Washington? What is it called?

What privilege is denied to dwellers in the Capitol city which citizens in every other city possess?

What change in economic conditions took place in the city about six months after America entered the War of the Nations?

How can you tell, by the numbers on the homes, how far you are from the Capitol?

one good tavern and several other houses are finished or being built." In 1814, during the War of 1812, a British army captured the city and burned the Capitol, the White House and other public edifices, but these were rebuilt after the close of the war. During the War of Secession Washington was several times threatened by the Confederates, but was never captured. In 1871 extensive improvements were begun, as a result of which Washington developed into a city worthy to be the capital of the great republic. In 1917, when the United States entered the War of the Nations, it became one of the world's great war capitals. In November of that year prohibition became effective in the city and District. See DISTRICT OF COLUMBIA. B.M.W.

Consult Bryan's *History of the National Capital;* Taft and Bryce's *Washington, the Nation's Capital;* Leupp's *Walks about Washington.*

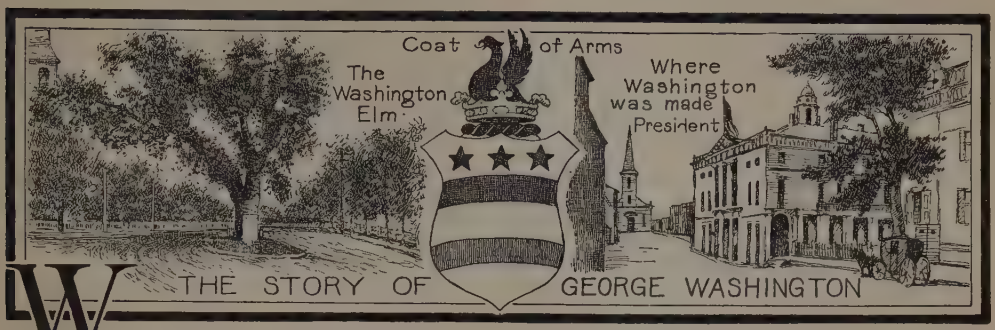
**WASHINGTON,** BOOKER TALIAFERRO (about 1859-1915), an American negro educator, very much in earnest, intensely devoted to the elevation of his race, and a practical, farseeing reformer. He was born near Hale's Ford, Franklin County, Va., the son of a mulatto slave and a white man. He was himself a slave in his childhood, but after the removal of his parents to Malden, W. Va., he was put to work in a salt block. While employed there, and later in the coal mines, he managed to obtain the rudiments of an education, and between 1872 and 1875 worked his way through the Hampton Normal and Industrial Institute (which see), by labor as janitor.

After teaching for a time and receiving some further instruction at the Wayland Seminary in Washington, D. C., he became an instructor in the Hampton Institute. Here he evinced such ability that he was chosen in 1881 to organize at Tuskegee, Ala., a school for negroes similar to that at Hampton, for which the state made an initial appropriation of $2,000 for salaries of teachers. From the little school with its thirty pupils which he opened in an old church, there has developed Tuskegee Normal and Industrial Institute (which see), the growth of which was due largely to the earnestness and practical good sense of the founder. He laid especial emphasis on the industrial education of the negroes, feeling that only as they gain economic independence can they hope for bettered conditions.

Booker Washington was a public speaker of note, and he often addressed audiences in all parts of the United States on his work at Tus-

kegee and on sociological topics relating to the people of his race. In an extremely busy life he found time to write *The Future of the American Negro*, the autobiographical *Up from Slavery*, *Working with the Hands*, *My Larger Education* and *The Man Farthest Down*.

Consult the books named above written by him; also, Holtzclaw's *The Black Man's Burden*.




**WASHINGTON**, GEORGE (1732-1799), an American soldier and statesman, first President of the United States, the greatest figure in America in the eighteenth century. One of the most recent historians of the American people has said that "General Washington is known to us, and President Washington; but George Washington is an unknown man." Washington stands as a type, and has stamped himself on the world's imagination. In the progress of time he has become more or less mythical, and the real Washington has become almost lost to sight. He has been pictured as a lonely figure, of lofty intellect and tremendous moral force, who had about as much warmth as an ancient statue.

It is true that this myth has some reality in it. In Washington there was something of greatness, of majesty, or whatever people choose to call it, which held men aloof. He was a difficult man to know, and though he wrote thousands of letters, speeches and messages, scarcely one of these reveals anything of the man. But behind this myth is a real man, a man of thoughts and emotions, a man who had visions of the future as well as sharp, vivid pictures of the present. He was great as a soldier, equally great as a statesman, greater as a leader of men, but greatest of all merely as a man. And he who fails to see the humanity of Washington fails utterly to grasp the meaning of his life.

So great an impression did Washington make on the world in his own lifetime that strangers undertook to construct for him a suitable family tree. One of these genealogists wrote to Washington about his ancestry. Washington replied politely, giving the names of the Virginia Washingtons, but explaining that he knew practically nothing about the family in England. He had been, he said, a busy man, and had paid but little attention to the subject. It is now fairly well established, however, that George Washington was descended from the Washingtons of Sulgrave Manor, in Northamptonshire, the family running back to a Norman knight, Sir William de Hertburn. Sir William, about the year 1180, became knight of a little village of Wessyngton, or Washington, in the north of England, from which the family took its name.

Many of the Washingtons became eminent. One, in the sixteenth century, was mayor of Northampton, and in 1538 received Sulgrave Manor as a gift from King Henry VIII. Several of the mayor's descendants were conspicuous in the armies of Charles I, and one was implicated in Monmouth's rebellion. On the whole they were a successful, thrifty race, "owning lands and estates, wise magistrates and good soldiers, marrying well, and increasing their wealth and strength from generation to generation."

In 1658, two brothers, John and Lawrence Washington, bought lands in Westmoreland County, Virginia. John became prominent in the colony, was elected to the house of burgesses, and at one time was a colonel of the Virginia militia. He left a fair estate to be divided among his children, the eldest of whom was Lawrence. Lawrence's second son was Augustine, who married first Jane Butler, by whom he had three sons and a daughter, and second, Mary Ball, by whom he had four sons and two daughters. The second son of this second marriage was christened George. He was born on February 11, Old Style, or February 22, New Style, 1732. His birthplace, the

family home at Bridges Creek, in Westmoreland County, is described as a plain wooden farmhouse, with four rooms on the ground floor, an attic with a long, sloping roof, and a great brick chimney. Three years later the family moved

BIRTHPLACE OF WASHINGTON

to Stafford County, to an estate on the Rappahannock nearly opposite Fredericksburg. There Augustine Washington died in 1743, at the early age of forty-nine, and there his son George spent his boyhood.

**The Boyhood of Washington.** Washington's boyhood, like much of his later life, has been the subject of many pleasant fictions. The best known of these is the incident of the cherry tree and the hatchet, a story which has absolutely no foundation. George was early noted as a truthful lad, but there is no evidence that he ever cut down a cherry tree and then confessed to his father. Many other stories about him became current even during his lifetime, but most of them were equally without foundation. The real facts known about his boyhood are few. Shortly after the family moved to the banks of the Rappahannock, George was placed under the charge of the parish sexton, a man named Hobby, who taught him the alphabet. Soon after his father's death he was sent back to Bridges Creek, to live with his half brother Augustine and to attend a school, in which he received what was the equivalent of a fair, common-school education.

George was a leader among his boy friends. He was tall and muscular, and matured early, both physically and mentally. He was a clever horseman, and he could outwalk or outrun any of his companions. He was a good boy, but not a "goody-goody" boy, and was liked by all who knew him. His famous rules of conduct were written at the age of thirteen.

At fourteen George was strong and hearty, and he offered a serious problem to his widowed mother. His father had left them well provided with land, but with little money, and Mrs. Washington, with five young children, was naturally anxious to have each begin to earn a living. Shortly after his fourteenth birthday, therefore, an effort was made to get George a place on a merchant ship, in the hope that he might ultimately become a merchant-captain or even possibly get a commission in the British navy. But as no chance appeared at the right time, George went back to his studies, particularly mathematics. He studied diligently, although he was not naturally a scholar, and at sixteen he was fitted to be a surveyor.

While learning the art of surveying he was also acquiring knowledge of another sort, from his contact with older men and women. His most intimate friend was his eldest half brother Lawrence, fourteen years his senior. Lawrence Washington was a man of the world, had been educated in England and had fought in the British navy during the War of the Spanish Succession. After the death of his father Lawrence was both father and brother to George. Lawrence Washington was connected by marriage with the Fairfaxes, the head of that family being Thomas, the Sixth Baron (1692-1782). Lord Fairfax was a cultured man, distinguished, generous and kind. Between him and young Washington there sprung up a firm friendship, and from him the boy gained a knowledge of men and manners which no school could give. The experienced man of the world saw in Washington not merely a brave, diligent boy, but so much more that he gave him his first work.

**Life on the Frontier.** It was in March, 1748, that George Washington, accompanied by George Fairfax, a relative of his patron, set forth for the frontier. He was just past his sixteenth birthday. He was tall, already nearly six feet, but rather spare. His light-brown hair was brushed back from a broad forehead, and his open face, with its sober, gray-blue eyes, gave him an appearance of calmness and strength. Washington's task was to cross the Blue Ridge Mountains, work his way up the valley of the Shenandoah, and survey the vast Fairfax estates, whose boundaries had never been defined. So well did he do his work that Lord Fairfax procured for him an appointment as public surveyor. Surveying was a rough life, but Washington thrived under exposure. In a letter to a friend he wrote at this time:

Since you have received my letter of October last, I have not slept above three or four nights in a bed, but, after having walked a good deal all day, I have lain down before the fire upon a little hay, straw, fodder, or a bearskin, whichever was to be had, with man, wife, and children, like dogs and cats; and happy is he who gets the berth nearest the fire.

Three years thus slipped by in hard work, mixed with recreation on the estates of his brother Lawrence and of Lord Fairfax. Lawrence Washington's health, affected by exposure during the War of the Spanish Succession, caused alarm in 1749 and in 1750, and as a last resort in 1751 he made a trip, with his brother George, to the West Indies. When they arrived they were promptly invited to dine with the major in command of the local British forces. In his diary George remarked: "We went—myself with some reluctance, as the smallpox was in the family." George fell a victim to his good manners, and had a mild case of the smallpox. In July, 1752, four months after their return to Virginia, Lawrence Washington died, leaving George the guardian of a daughter, and the heir to the family estates in the event of that daughter's death.

While Washington's home relations were thus undergoing great changes, his relations to public affairs were becoming more marked. Even before he was legally of age he had saved considerable sums out of his fees for surveying, had bought several parcels of land and had won a reputation for solid worth unusual in so young a man. His brother Lawrence, who had long before become manager of the Ohio Company, procured for him an appointment as one of the adjutant-generals, with the rank of major, in the Virginia militia, a remarkable honor for a boy of nineteen. At the same time George was studying the art of war, under the instruction of two friends of Lawrence's. When Governor Dinwiddie of Virginia wanted a man to undertake the dangerous mission of warning the French not to trespass in English territory, his choice fell on the recently-appointed adjutant-general. In October, 1753, Washington set forth, accompanied by Christopher Gist, noted as the boldest frontiersman of Virginia. In spite of hardship, treachery by the Indians and accidents which almost cost their lives, the men carried out their mission, and finally returned to Williamsburg, then capital of Virginia.

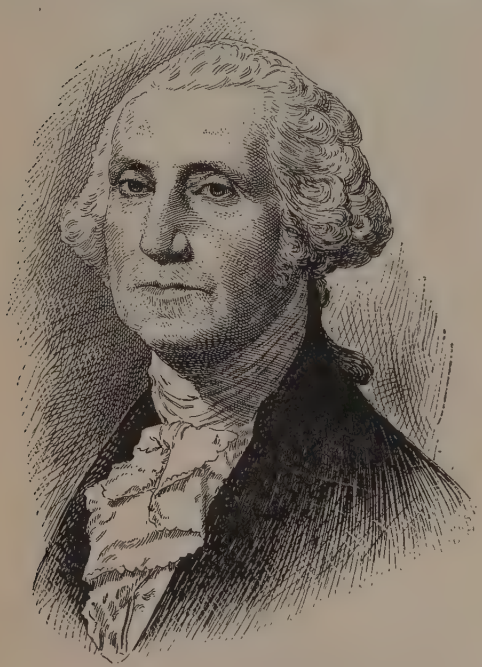
The information Washington gleaned on his expedition spelled war. Shortly after his return he was appointed lieutenant-colonel of the single regiment which constituted Virginia's military force. Taking half the regiment to defend the outposts on the Ohio, Washington advanced to meet the French, and in a preliminary skirmish routed a small band of the enemy. But the French were much the stronger, and Washington's position was not an enviable one. The death of the colonel left him in command, and he reunited the two halves of the regiment. At Great Meadows the exhaustion of his men compelled a halt, and there he ordered the hasty construction of a little stockade, which he named Fort Necessity. There the French appeared on July 3, 1754. Hopelessly outnumbered, without ammunition for their worn-out muskets, the colonists agreed to a parley. The French were not eager to fight, and allowed the English to retire with their arms on condition that they should not come to the Ohio for a year. Thus nothing came of the expedition, but Washington gained valuable experience, and for the moment won a reputation not only in Virginia but throughout the colonies and even in Europe. Shortly after this expedition, the Virginia militia was reorganized. The result would have been to make Washington, the only officer who had seen fighting, a captain on a par with numerous other officers, but Washington rightly resented this senseless policy, and resigned his commission. A proud man, conscious of his own strength and purpose, he was irritated by the bickerings in the militia, and determined for a time to keep out of military life.

The opportunity to reënter the army came more quickly than he expected. The campaign of 1754 aroused the other colonies, as well as the mother country. In accordance with a general plan to attack the French, General Braddock arrived in Virginia late in February, 1755, with two picked regiments. Braddock, learning that Washington had expressed a desire to be in service again, offered the young Virginian a place on his personal staff with the rank of colonel. Washington accepted at once, and threw himself into his new work. The expedition, as every school child knows, was doomed to failure. After months of delay, the army finally moved forward, and on the eighth of July arrived in front of Fort Duquesne. In the attack Washington was everywhere. He had two horses shot under him, and his coat showed four bullet holes. But nothing could turn away defeat. After Braddock was mortally wounded the command fell on Washing-

ton, who rallied the defeated British soldiers, and drew them from the field. Washington it was who laid Braddock in the grave four days after the battle, and read over the open grave the solemn burial service of the Church of England. For the next three years Washington commanded all the Virginia forces. What he did may be described in his own words:

> I have been posted, then, for more than twenty months past, upon our cold and barren frontiers, to perform, I think I may say, impossibilities; that is, to protect from the cruel incursions of a crafty, savage enemy a line of inhabitants, of more than 350 miles in extent, with a force inadequate to the task.

For a year after he wrote this letter he continued to serve, in spite of many difficulties in front and much narrowness and stupidity behind



Washington's a watchword, such as ne'er
Shall sink while there's an echo left to air.
—BYRON: *Age of Bronze.*

him. In 1758, however, his health gave way, and he resigned his command and withdrew to Mount Vernon. Later in the year, however, after Pitt took the helm in England, Washington had the satisfaction of accompanying the British force which entered the burning ruins of Fort Duquesne. The fort was renamed Fort Pitt, and on its site stands the city of Pittsburgh.

**The Master of Mount Vernon.** Through the death of his half brother Lawrence's daughter, Washington became the owner of the estate of Mount Vernon. To these lands he added large tracts by his marriage to Mrs. Martha Dandridge Custis, a charming young widow, pretty, intelligent and wealthy. Just twenty-seven when he married, life must have looked very pleasant to him. Already one of the most distinguished men in the colonies, he was now happily married and in the possession of considerable wealth, so that the financial strain which had often distressed him was now relieved. His neighbors testified to their good opinion of him by electing him to the house of burgesses. He made his home at Mount Vernon, to which he added many acres, and by careful management made it one of the best plantations in the colonies. He loved country life, the fresh, open-air existence in woods and fields. He always had superb horses and hounds, and in season he hunted almost every day.

Mount Vernon during hunting season was filled with guests, for Washington, always reserved and silent as to himself and his own thoughts, nevertheless liked a houseful of people about him. On those rare occasions when the family dined alone, the event was sufficiently out-of-ordinary to call for a special note in his diary. All in all, it was a wholesome, many-sided life. He was active in the church vestry and in the house of burgesses. It was a life which would have made some men rusty and useless, but it merely ripened Washington and kept him on a fine edge. He remained athletic and enduring, and his mind, like his body, was fresh and keen.

During the critical decade beginning in 1765 Washington said little in public, but he thought much. It was characteristic of him that he introduced into the house of burgesses the first nonimportation resolution. Virginia as a whole did not live up to the resolution for many months, but Washington would not allow tea or any of the forbidden articles in his house. For a long time Washington held aloof from the extreme partisans of both sides, because he felt that armed resistance on the part of the colonies should be only the last resort. He remained to the very last on friendly terms with Lord Dunmore, the royal governor, and he dined with the governor and Lady Dunmore on the very night before the Boston Port Bill went into effect. That day, June 1, 1774, was appointed by the Committees of Correspondence as a day of fasting and prayer. On May 31 Washington dined with the Dunmores, but

on June 1 he fasted all day and attended the divine services requested by the Committees.

At the Virginia provincial convention, held at Williamsburg on August 1, 1774, Washington was foremost in insisting that the colonies should have the right of self-government, and made one of the few impulsive speeches of his life. "I will raise a thousand men," he said, "subsist them at my own expense, march with them, at their head, for the relief of Boston." The convention elected him one of six delegates to represent Virginia in the First Continental Congress. In that body he was a silent member. He took no part in debates, had no share in the historic documents which it drafted; yet in some way his character was impressed on all the delegates. Patrick Henry said of him, "If you speak of solid information and sound judgment, Colonel Washington is unquestionably the greatest man on the floor."

Washington spent the winter of 1774 and 1775 at Mount Vernon, and in April he started again for Philadelphia. In the sessions of this Second Congress he appeared every day in the blue and buff uniform of a Virginia colonel—his way of saying that to his mind the hour for action had come. On June 15 Congress unanimously voted to make him commander-in-chief "of all the Continental forces raised, or to be raised, for the defense of American liberty." On the next day Washington accepted the trust. Addressing the Congress, he said that as no pecuniary consideration could have induced him to undertake the work, he must decline all pay or emoluments, only looking to Congress to pay his expenses. He at once set out on horseback for Boston, and on July 3, 1775, standing under the historic elm (see page 4986), he took command of the Continental army at Cambridge.

**During the Revolutionary War.** The army over which Washington assumed command was an army by courtesy. There were about 14,000 men; there was no discipline; the men elected their own officers, and did generally about as they pleased. It had no arms, no ammunition, no commissary department, no *esprit de corps*. Out of this heterogeneous mass Washington had to weld an army. He was in constant correspondence with various committees of Congress, and with governors of the colonies and later of the states. He had to use every possible weapon to force these various officials to grant the requests he made from time to time.

Probably no other great general has waged war successfully under as many and as great difficulties. Nothing was right; there was no organization or coördination, political, social, economic, military—and as soon as Washington contrived one or the other somebody was sure to threaten its existence or actually destroy it. He knew scarcely from one day to the next how many men comprised his army. Men from each state enlisted for varying terms, pay was small and irregular, desertions were made by the wholesale. There was incessant quarreling among the troops, and sectional jealousies caused all kinds of plots; but through it all rode the chief, sometimes irritated—on one or two rare occasions he is said even to have cursed—but for the most part hopeful, calm, tactful, patient, judicial.

In spite of all these handicaps, Washington proved himself a brilliant tactician. The attempt to take Quebec and Montreal in 1775 was one of the boldest and most brilliant schemes of the war. It failed, but it revealed the great soldier. Again, in the Trenton campaign, Washington saw the desperate need of taking the last chance; and he never failed to time military with political needs. The Trenton campaign revealed the man who recognized the supreme moment, when everything must be risked to save the state. The victories of Trenton and Princeton were decisive battles; but for them the Revolution would almost surely have been snuffed out. Washington was one of the great generals who knew how to retreat, when to retreat and when to halt. When the enemy least expected him to resist, he not merely halted, but assumed the offensive, as at Trenton and Princeton. To the very end, at Yorktown, his tactics were those of a master.

Like a few other great commanders, like Napoleon and Lee, for example, Washington stands out among military leaders for the devotion he inspired in his men. This devotion he returned, and added to it a comprehension of their difficulties and sorrows which they could not reciprocate. When the army was about to go into winter quarters at Valley Forge, the Pennsylvania legislature remonstrated, saying that the army should remain in the field. To them Washington replied in a letter which must have reached their consciences. After pointing out the failure of Pennsylvania to supply men, food and clothing, he continued as follows:

> But what makes this matter still more extraordinary in my eyes is that these very gentlemen should think a winter's campaign and the covering of these states from the invasion of an

enemy so easy and practicable a business. I can answer those gentlemen that it is a much easier and less distressing thing to draw remonstrances in a comfortable room, by a good fireside, than to occupy a cold, bleak hill, and sleep under frost and snow, without clothes or blankets. However, although they seem to have little feeling for the naked and distressed soldiers, I feel superabundantly for them, and from my soul I pity those miseries which it is neither in my power to relieve or prevent.

This was good, plain English, and here was a man who was not a safe person to oppose too far. His soldiers knew that he felt for them and that he did for them all that was humanly possible, and for him they suffered as they would for no other leader. But when the war was over, Washington asked nothing more than peace and quiet for himself and justice for his soldiers. He urged Congress to pay their claims, and then, at the close of the year 1783, he resigned his commission and retired to private life.

In the interval which then elapsed before Washington was recalled from Mount Vernon to become the first President of the United States, he found plenty to do on his plantation. His personal affairs had suffered much for lack of attention, and he was also interested in the course of public affairs. It was natural that Virginia should send him as a delegate to the Constitutional Convention at Philadelphia in 1787, and equally natural that he should be chosen to preside over that body. Then, after the Constitution was adopted, he was unanimously elected to the Presidency.

## *The Administration of George Washington*

That the labors of the Constitutional Convention would have been brought to a successful conclusion without the assistance of George Washington is doubtful. After the Constitution was drafted he labored constantly, chiefly by letters to his friends, to arouse public opinion in its favor. Certainly without his support the Constitution would have been defeated in Virginia, and without Virginia the new plan would almost surely have failed. Then, when the great experiment was about to begin, it was fitting that he should again take the chief command. Without any seeking on his part, the Presidency was placed on his shoulders by the unanimous vote of the Electoral College. John Adams was elected Vice-President. Washington left Mount Vernon for the North on April 16, 1789. He wrote in his diary:

About ten o'clock I bade adieu to Mount Vernon, to private life, and to domestic felicity; and with a mind oppressed with more anxious and painful sensations than I have words to express, set out for New York, with the best disposition to render service to my country, in obedience to its call, but with less hope of answering its expectations.

From Mount Vernon to New York it was a long, triumphal procession. The roads were lined with people to see him pass. In the villages all work stopped, bells were rung and guns were fired, and flowers were scattered in his path. Through it all Washington was profoundly moved, but sober and almost sad. To his constant friend, his diary, he confided that the ovations filled his mind with "sensations as painful (considering the reverse of this scene, which may be the case after all my labors to do good) as they were pleasing." In other words, he was thinking more of the greatness of his task than of his present glory. He was inaugurated on April 30. After taking the oath of office on the balcony of the Senate Chamber, he withdrew into the Chamber and read his inaugural address to the assembled Congress.

**Organizing the Government.** With characteristic thoroughness Washington at once undertook to inform himself of the details of his new task. He personally supervised the organization of the different departments of the government. It is interesting that his Cabinet, which included Thomas Jefferson, Alexander Hamilton, Henry Knox and Edmund Randolph, was not appointed until September, more than four months after Washington took office.

The three great events of Washington's first term were the adoption in 1789 of the first import tariff, following Hamilton's famous *Report on Manufactures;* second, the establishment of the Bank of the United States; and third, the assumption of the state debts and the funding of the national debt. All three measures were largely the work of Alexander Hamilton. (See TARIFF; BANK OF THE UNITED STATES; HAMILTON, ALEXANDER.) The controversy over the assumption of state debts was linked with the question of the location of the national capital. By clever manipulation votes for the assumption were secured on condition that the capital should be located in the South. Shortly after the organization of the govern-

ment North Carolina ratified the Constitution, and in 1790 Rhode Island, the last of the original thirteen, did the same. The Union was further enlarged by the admission of Vermont in 1791 and Kentucky in 1792. In September, 1789, the United States Supreme Court came into existence. About the same time the national mint was established at Philadelphia, and the decimal system of coinage was adopted. In 1791 the first ten Amendments to the Constitution were adopted. Benjamin Franklin died in 1790.

The success of the first administration, particularly the President's tact in reconciling personal and political differences among the leading public men, and also his skill in organization, led to a general demand that Washington, in spite of his personal reluctance, should accept a second term. Washington finally yielded, was unanimously reëlected, and on March 4, 1793, was inaugurated a second time.

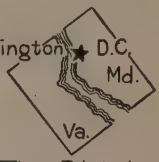
**The Second Term.** Washington's first term, though troubled in certain aspects, was peaceful. The country was giving its time to organization. From the very beginning of his second term, there was a distinct change. The United States was drawn into the complications of European politics. Great Britain and France were at war, and there was one faction in the United States which argued that gratitude, if nothing more, demanded that the United States should assist its late ally. A second party opposed participation in the war, or even favored giving support to England. Washington issued a proclamation of neutrality, which was insultingly ignored by Citizen Genet (see GENET, EDMOND). The Genet incident was followed by the Jay Treaty (1795), which enraged those who approved of Genet's activities. But throughout all the turmoil Washington held fast to his purpose and saved the country from "entangling alliances" which would probably have endangered the independence of the new republic.

Noteworthy among the other events of this term was the Whisky Insurrection (which see) in Pennsylvania. The effective assertion of Federal authority against the malcontents in Pennsylvania was one of the most important acts of the administration, for it proved beyond doubt that the government had power and could wield it. Relations with the Indians were troubled. General Harmar made an unsuccessful expedition against them in the Northwest in 1790, and General Saint Clair suffered a disastrous defeat in 1791, but Anthony Wayne

## 1789 WASHINGTON'S ADMINISTRATION 1797

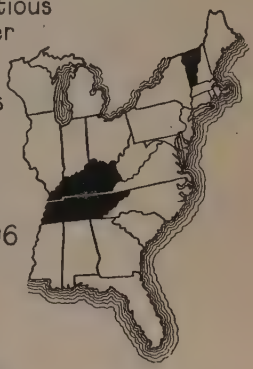
First Presidential Mansion, New York City

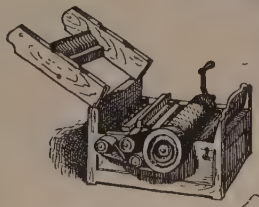
Citizen Genet, France's Ambitious Trouble-Maker



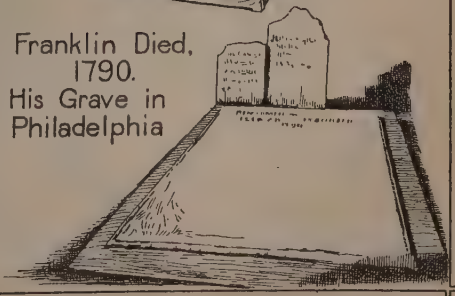

The District of Columbia Located

Three States Admitted to the Union, Vermont, 1791 Kentucky, 1792 Tennessee, 1796





The First Cotton Gin



Franklin Died, 1790. His Grave in Philadelphia

## *Washington's Birthday*

SUGGESTIVE PROGRAMS

I hope I shall always possess firmness and virtue enough to maintain what I consider the most enviable of all titles, the character of an "Honest Man."

I

Song, *America*
Roll Call, Quotations from Washington, including *Rules of Conduct*
Flag Salute
Essay, *History of the Flag*
*George Washington*.....*J. H. Ingham*
Essay, *The Boyhood and Youth of Washington*
Hatchet Drill
*Washington*, from the *Commemoration Ode*.....*Harriet Monroe*
Essay, *The Winter at Valley Forge*
Song, *Columbia the Gem of the Ocean*
Minuet, by pupils in colonial costume

II

Song, *Hail Columbia*
Roll Call, Quotations about Washington
Unveiling of picture or bust of Washington
Tableau, George Washington and the Cherry Tree
*Washington*.....*James B. Hope*
Essay, *Washington, the Soldier*
Flag Drill
Essay, *Washington, the President*
*Washington's Statue*...*H. T. Tuckerman*
March, the pupils laying flowers before the picture or bust
*Song of a Thousand Years*

gained a victory over them in the Battle of Fallen Timbers in 1794. In the next year two important treaties were negotiated; one provided for the cession of 25,000 square miles by the Indians; the other gave the United States the free navigation of the lower Mississippi, then owned by Spain.

In political matters Washington's second term was marked by the widening of the breech between Hamilton and Jefferson and the gradual development of two opposing parties. The invention of the cotton gin by Eli Whitney in 1793, which was destined to bring about an industrial revolution, was no less important, in its political as well as economic results, than the organization of political parties. The Yazoo Land Frauds (1794), the sale of the Western Reserve by Connecticut in 1794, the decision of the United States Supreme Court in 1793 in the case of *Chisholm vs. Georgia* (which led to the adoption of the Eleventh Amendment to the Constitution); organization in 1789 and 1795 of several counties in Illinois, then the outposts of the West; the construction of the first woolen mill in Massachusetts (1794); and the admission of Tennessee (1796) to the Union, are all worthy of special mention.

On September 17, 1796, Washington delivered the historic "Farewell Address," which stands with Lincoln's Gettysburg Address and his Second Inaugural Address and the war messages of Woodrow Wilson among the gems of American thought.

Be Americans [he said]. Let there be no sectionalism, no North, South, East or West; you are all dependent one on another, and should be one in union. . . . . Beware of the baneful effects of party spirit and of the ruin to which its extremes must lead. Do not encourage party spirit, but use every effort to mitigate and assuage it. Keep the departments of government separate, promote education, cherish the public credit, avoid debt. Observe justice and good faith toward all nations; have neither passionate hatreds nor passionate attachments to any; and be independent politically of all. In one word, be a nation; be Americans, and be true to yourselves.

**His Last Days.** At the end of his second term Washington returned to live at Mount Vernon. He found his estate in sore need of his attention, and in a letter written a month after his return he said that he was "already surrounded by joiners, masons, and painters; and such is my anxiety to get out of their hands, that I have scarcely a room to put a friend into or sit in myself without the music of hammers or the odoriferous scent of paint."

# *OUTLINE AND QUESTIONS ON GEORGE WASHINGTON*

## *Outline*

**I. Early Life**

(1) Birth and family
  (a) The family in England
  (b) His ancestors in America
(2) Boyhood
  (a) Education
  (b) Leadership among friends
(3) Study of surveying
(4) His first work
(5) Years as surveyor

**II. Early Military Activities**

(1) Dangerous mission to the French
(2) Preliminary skirmishes with the French
(3) Braddock's campaign

**III. Happy Years as Private Citizen**

(1) Mount Vernon acquired
(2) Marriage
(3) Mode of life at Mount Vernon

**IV. Early Public Life**

(1) In Virginia house of burgesses
(2) In First Continental Congress
(3) In Second Continental Congress
(4) Appointed commander-in-chief of continental forces

**V. The Revolutionary War**

(1) Difficulties to overcome
(2) Battles fought
(3) Eminent qualities as general
(4) Attitude of soldiers towards him
(5) Part in Constitutional Convention

**VI. Administration**

(1) Triumphal journey to New York
(2) Organizing the government
  (a) Appointment of Cabinet
(3) Domestic events
  (a) First import tariff adopted
  (b) Bank of United States established
  (c) National debt funded
  (d) Location of capital decided upon
  (e) Constitution ratified by last of thirteen colonies
  (f) Vermont, Kentucky and Tennessee admitted
  (g) Supreme Court established
  (h) National mint established
  (i) First eleven amendments adopted
  (j) Whisky Insurrection
  (k) Indian troubles
  (l) Development of opposing parties
  (m) Yazoo Land Frauds
(4) Foreign complications
  (a) Genet incident
  (b) Jay Treaty
  (c) Treaty with Spain
(5) General affairs
  (a) Death of Franklin
  (b) Cotton gin invented

## *Questions*

What was the attitude of Washington's soldiers toward their chief? Relate an incident which shows this attitude was justified.

How many votes were cast against Washington at the time of his first election to the Presidency? At his second?

What is meant by the statement "General Washington is known to us, and President Washington; but George Washington is an unknown man?"

What story that has been constantly told about Washington for many years has absolutely no foundation in fact?

Do you think you would have liked George Washington as a boy? Why?

When did Washington resign his commission, and why? When did he reënter the army?

What famous man declared that Washington was "unquestionably the greatest man" in a certain assembly? What was the assembly?

What showed Washington's unselfish patriotism in his acceptance of the post of commander-in-chief?

From the cares of a Virginia landlord his attention was soon distracted in 1798 by rumors of war with France. Reluctantly he accepted appointment as commander-in-chief of the provisional army, and for many months busied himself with the details of organizing this new force. When the danger was past he returned to his usual round of duties at Mount Vernon. There, on December 12, 1799, he was exposed in the saddle for several hours to cold and snow, with the result that he had an attack of acute laryngitis. The disease was a simple one, but according to the methods of the time the chief remedy, which was useless, was bleeding. The physicians called it quinsy, but in fact Washington was being slowly strangled to death by the closing of his throat. His sufferings were acute, but he bore them quietly, gave his last instructions clearly and concisely, and at the very moment of death was taking his own pulse. About ten o'clock on the last day of the last month of the old century, December 31, 1799, he passed away.

The news of his death caused mourning in Europe as in America. The armies of Napoleon and the fleets of England alike paid honor to his memory. And the tribute of his old friend "Light-Horse Harry" Lee, was almost worth dying for:

> First in war, first in peace, and first in the hearts of his countrymen.

He was buried in the family vault at Mount Vernon, where three years later Martha Washington was laid to rest beside him. W.F.Z.

Consult Lodge's *George Washington;* Carrington's *Washington, the Soldier;* Rush's *Washington in Domestic Life;* Irving's *Life of Washington.*

**WASHINGTON,** MARTHA (1732-1802), the wife of George Washington and the daughter of a wealthy planter, John Dandridge, was born in New Kent County, Va., in May, 1732. At the age of seventeen she was married to Daniel Parke Custis, and in 1759 to Washington. No children were born to them, but the son of her son by her first husband was adopted by Washington, and bore the name of George Washington Parke Custis. During the war she aided the American soldiers in every way possible, and when Washington became President she made a charming and extremely popular hostess. The courtesy title of "Lady Washington" was bestowed on her by general consent. After her husband's death she lived at Mount Vernon for the three remaining years of her life.

MARTHA WASHINGTON

**WASHINGTON,** PA., a borough and the county seat of Washington County, located in the southwest corner of the state, thirty-two miles southwest of Pittsburgh, with which it is connected by an interurban line, and fifteen miles east of the West Virginia boundary line. Railroads entering the borough are the Pittsburgh, Cincinnati, Chicago & Saint Louis, the Baltimore & Ohio and the Waynesburg & Washington. The population increased from 18,778 in 1910 to 21,618 in 1916 (Federal estimate).

The educational institutions of the place include Washington & Jefferson College, Trinity Hall, a military school, and Washington Female Seminary. Features of note are a Federal building, completed in 1906 at a cost of $60,000, a courthouse, costing $1,000,000, a public library, two hospitals, a sanatorium and Washington and College parks. Oil wells and coal mines are the natural wealth of the section, and in the town there are manufactories of glass, tin plate, window glass, clay pottery, tubing, baby carriages and foundry and machine-shop products. The settlement, first called Bassettown, received the name of Washington in 1784. It was incorporated as a township in 1810, and became a borough in 1852. Washington is in the section where occurred the Whisky Insurrection (which see) in 1794. C.M.K.

**WASHINGTON,** TREATY OF, a treaty entered into by the United States and Great Britain in 1871, which provided a means for the amicable adjustment of the Alabama Claims, the Northwest boundary controversy and conflicting fishing rights in the Pacific. The commission, which consisted of five representatives of the United States and an equal number from Great Britain, met at Washington, D. C., on May 8, and held thirty-eight sessions. The treaty, which was proclaimed on July 4, referred the Alabama Claims to a special court to be assembled at Geneva (see ALABAMA, THE; GENEVA ARBITRATION). The troublesome Northwestern fishery dispute was referred to a mixed commission, and the dispute with regard to the Northwestern boundary was submitted to

the emperor of Germany. The commission further declared certain regulations with regard to neutrality in war.

**WASHINGTON,** UNIVERSITY OF, at Seattle, a state coeducational institution beautifully located on a campus of 355 acres on the shores of lakes Washington and Union. It was organized in 1861, but it was not until 1877 that four years of college work were given. Since the admission of Washington as a state, in 1889, the university has shown remarkable development. The institution is organized into the colleges of arts and sciences, engineering, forestry, law, mines and pharmacy, the graduate school and the summer school. The university coöperates with the United States government in military training, mine-rescue training, timber testing, geological surveying and the utilization of forest products. Through the gifts of the Alaska-Yukon-Pacific Exposition, held on the campus in 1909, the school came into possession of some very valuable buildings and displays. The faculty numbers over 200, and the student enrolment is about 4,000. There is a library of 77,785 volumes.

**WASHINGTON AND LEE UNIVERSITY,** a coeducational school located at Lexington, Va., which is indebted greatly to both of the illustrious Americans for whom it is named. It was founded in 1749 as Augusta Academy by a company of Scotch Presbyterians, and received from General Washington its first significant gift—stock in a canal company presented to him by Virginia in recognition of his distinguished service during the Revolution. The university still realizes $3,000 annually from this gift. In 1798 the name was changed to Washington Academy, and in 1813 to Washington College. Lee, with characteristic devotion and energy after the War of Secession, immediately took up a definite burden, the rebuilding of Washington College. For five years (1865-1870) he served as its president (see page 3368), and laid the foundation of its later development. In 1871, the year following Lee's death, the school was given its present name. It is organized into a college, a school of commerce, a school of applied science and a law school. There are about thirty instructors, and over 500 students. The library contains 50,000 volumes.

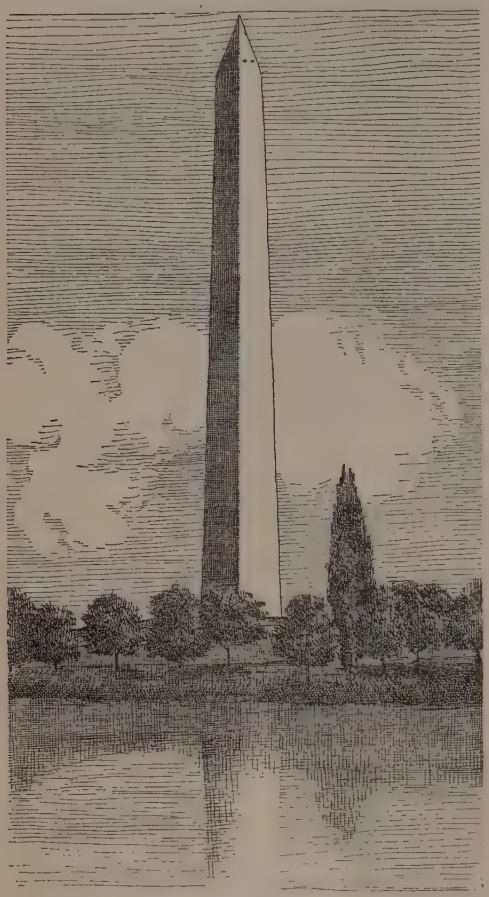
**WASHINGTON ARCH,** a granite memorial building which stands on the north side of Washington Square, New York, at the head of Fifth Avenue. It was erected in 1889, to commemorate the centennial of the inauguration of George Washington as first President of the United States. The design was made by Stanford White, and the entire cost of construction was $128,000, which was raised by popular subscription. The structure as a whole is 77 feet in height and 62 feet in breadth, while the single archway is 47 by 30 feet. See illustration, page 4206.

**WASHINGTON ELM.** Visitors in Cambridge, Mass., are always interested in an old elm that stands near the northwest corner of the Common. On a stone slab at the base they may read this inscription: "Under this tree Washington took the command of the American Army, July 3, 1775." In the days of the Revolution the famous Washington Elm was a noble tree with wide-spreading branches, but the greater part of it has now fallen into decay. See illustration, page 4986.

**WASHINGTON MONUMENT,** a huge obelisk in Washington, D. C., erected in honor of George Washington. It stands in a spacious park, south of the White House grounds, near the Potomac River. Some such memorial was proposed during the lifetime of the first President, but actual work on it did not begin until 1848. For seven years construction proceeded, but was then interrupted on account of shortage of funds and was not taken up again until 1878. From that time work on it was pushed, and by February 22, 1885, the monument was ready for dedication. The early part of the work was in the hands of the Washington National Monument Society, but in 1877 the funds and the responsibility were turned over to the United States government. The total cost was nearly $1,200,000, most of which was met by Congressional appropriation, though a portion was collected by popular subscription.

The monument is a shaft of masonry, the tallest in the world, its total height being 555 feet, five and one-eighth inches. It is fifty-five feet square at the bottom and thirty-four at the top, and the pyramid which forms the apex is fifty-five feet in height. The whole structure weighs 43,633 tons. The outside is faced with Maryland marble, pure white, and the tip is protected with a cap of aluminum. On the inner walls are set stones and tablets which were contributed by different states, countries, cities and societies, and many of these have a most interesting history. There is, for instance, a stone from the old Greek Parthenon, one from Vesuvius, one from the ruins of ancient Carthage; others came from historic scenes in the life of Washington him-

self. Churches are well represented by memorial tablets, and such societies as the Masons and the Odd Fellows sent like contributions. The interior of the shaft is lighted by electricity, and may be ascended either by means



WASHINGTON MONUMENT
The tallest shaft ever erected to honor the memory of a man.

of the 900 steps, or by a spacious elevator. At a height of 504 feet above the ground there are openings which afford a splendid view of the surrounding country and of the city which lies below; beyond this point visitors cannot ascend. A.MC C.

**WASHINGTON UNIVERSITY,** at Saint Louis, Mo., is a coeducational school, chartered in 1853. It was first organized by Dr. William Greenleaf Eliot, who stipulated that it was to be nonsectarian and nonpartisan. The original name, Eliot Seminary, was by the founder's request changed to Washington University. The work of the school was carried on in several different parts of the city until 1905, when all departments were removed to the present location. As early as 1894 a large tract of land, then outside the city limits, was purchased, and by 1902 there had been erected ten beautiful granite buildings. These and the grounds were leased to the Louisiana Purchase Exposition. At its close they were occupied by the university, and are now the western portion of beautiful Forest Park, a part of the splendid park and boulevard system of Saint Louis.

The university is organized into the college of arts and sciences (including engineering and architecture), school of law, medicine, dentistry, fine arts and social economy, and the Henry Shaw School of Botany. Professional degrees in engineering are not conferred until after at least three years of successful active practice. There are about 230 instructors, and the student registration is over 2,000. The number of volumes in the library exceeds 161,500.

**WASHITA,** or **OUACHITA,** *wahsh'i taw,* **RIVER,** a river which rises in Western Arkansas, flows east and then south into Louisiana, and joins the Red River about fifteen miles above the Mississippi. It is navigable for about 350 miles, as far as Camden, Ark., the year round. Smaller boats, and large boats for eight months of the year, can ascend seventy miles farther to Arkadelphia. The Washita is about 500 miles in length.

**WASP,** a flying insect which commonly is found in colonies which live only one summer. Wasps are usually black, with yellow markings; those called *hornets* have a reddish tinge. The females have a powerful sting. In the fall a colony deserts its nest, and all the members perish except a few females, which are to become mothers of new colonies. These pass the winter beneath stones or in hollow trees. In the spring the mother builds a nest of chewed wood or paper in a tree, or under the ground. She first hangs a pillar, then attaches at the bottom three cuplike cells, and lays an egg in each. She then builds more cells and lays more eggs, and as the eggs hatch into grubs, she keeps them supplied with food, consisting of chewed insects or honey. As fast as the larvae become wasps their cells are cleaned and more eggs are laid. The wasps hatched during the first half of the summer are imperfectly developed; they are workers, and help build the nest and feed the larvae. In a season of warm weather and plentiful food a wasp nest may contain 30,000

FACE OF A WASP

members. Wasps are useful in decreasing the number of flies and smaller insects.

Consult Morley's *Wasps and Their Ways;* Duncan's *Bees, Wasps and Ants.*

**WATAUGA,** *wah taw' ga,* **ASSOCIATION,** a party of settlers west of the Alleghany Mountains, who drew up the first written constitution adopted in America. When in 1768 the Six Nations by treaty surrendered all claim to the lands lying between the Ohio and the Tennessee rivers, settlers from Virginia and Pennsylvania crossed into the territory and in 1769 established a colony on the shore of the Watauga River. Three years later the Watauga Association was formed, and *Articles* were drawn up, providing for an executive council of five, a legislative body of thirteen, a sheriff and an attorney. None who had not signed the *Articles,* however, was held to be under their jurisdiction, and desperadoes from the neighboring states, especially Virginia and North Carolina, flocked to the settlement. In 1776 the community, under the name of Washington District, was permitted to send representatives to the assembly of North Carolina, and eventually it became a part of the state of Tennessee.

**WATCH,** a portable instrument for measuring time, invented about the year 1500 by Peter Hele, a clock maker of Nuremberg, Germany. A watch is constructed on the same general principles as a clock. As the ordinary watch is much smaller than a clock, its parts are smaller and require much nicer adjustment. The number of wheels and their arrangement corresponds closely in clocks and watches, but there is one important difference in the mechanism—a watch is regulated by a hairspring and balance wheel, whereas a clock is regulated by a pendulum. Most men carry their watches in their pockets, but women usually wear them in one of three other ways, either suspended from the neck by a chain, pinned to the dress or waist, or fastened to a bracelet around the wrist. Bracelet or wrist watches have become very popular; women in great numbers wear them, soldiers prefer them, because of convenience, and a few men in civil life wear them.

As the first essential of a watch is portability—that is, it must be small and must run correctly when being carried in any position—the early clock maker who set out to make such a timepiece was confronted by two great difficulties; first, all the parts had to be made by hand; second, a new motive power had to be found, for a weight could only be used in a clock, which always stood erect. The first difficulty was soon overcome by training skilled watch makers, and the second by the invention of the mainspring, about the year 1500. At first a straight spring was used, but this soon gave way to a coiled spring. The earliest watches bore little resemblance to those now manufactured; peculiarity of any kind seems to have been considered more desirable than accuracy in keeping time. These early watches were really expensive toys.

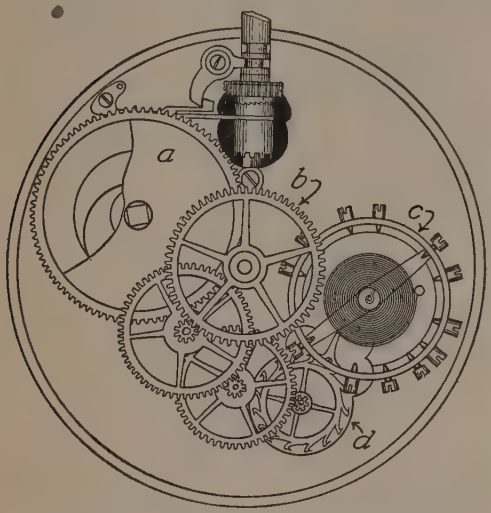
In the course of years, however, the practical value of these toys led to many improvements. The earliest watches had only the hour hands; the minute hand was an easy step forward. Enamel dials were first used about 1650, and a few years later the hairspring was added to the balance wheel. About 1700 it was discovered that garnet, ruby and other precious stones, though costly, made the best pivot bearings. All high-grade watches now have "jeweled movements." The last great improvement was the invention of automatic machinery for making the parts of a watch. Machinery made possible the standardizing of watch manufacture, and has made watch repairing, though still delicate work, a comparatively simple task, because all the parts of a machine-made watch can be readily duplicated.

Many of these early watches are still in existence, but few of them are in use. The life of a watch is almost impossible to estimate. With careful use and occasional cleaning and repairs, a medium-priced watch will outlive any man and will frequently be an heirloom for his children and their children. Most old watches now in existence are clumsy in appearance and unreliable as timekeepers, if compared with a modern watch. So great, however, are the improvements which have resulted from the perfection of watch-making machinery, that a good watch made in 1900 may reasonably be expected to keep good time in 1950 or even in 2000. Most watchmakers guarantee their watches for at least one year, and make repairs without charge, if any are necessary within that time.

A watch consists of two parts, the *case* and the *works.* The case is usually of metal, gold, silver or platinum being commonly used except in the cheaper watches, whose cases are made of nickel, gun metal or various alloys. The cases are often elaborately engraved, and ladies' watches are frequently set with precious stones. Many watches are made with a hinged cover

to protect the face; this style is called a *hunting case,* because such covers were once used almost exclusively on watches carried to the hunt. If the face is unprotected by such a cover, the watch is called *open-faced.*

The works, commonly called the *movement,* consists of a train of wheels, the spring which turns them, and the escapement which regulates their speed. The train of wheels oper-

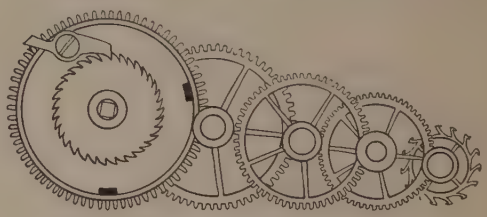



TRAIN OF WHEELS IN A WATCH
(*a*) Mainspring, connected with stem-winding apparatus.
(*b*) Center wheel, always in center; connected with wheels which drive second, minute and hour hands.
(*c*) Balance wheel.
(*d*) Escape wheel, moving back and forth timing movement of other wheels.

ates on the same principle as the wheels of a clock. The second hand is attached to a wheel which revolves once a minute, the minute hand once an hour, and the hour hand once in twelve hours. These various wheels are connected by pinions, as shown in the illustration; the number of teeth on both pinion and wheel are arranged to give the proper number of revolutions. The largest of the wheels, known as the barrel, contains the mainspring, whose unwinding turns the barrel. The barrel is connected with the stem-winding device. A little click or tooth catches the teeth of the ratchet on the barrel and prevents it from slipping. At the other end of the train is the escapement, consisting of the escape wheel, the pallet, the fork, roller and roller pin, balance wheel and hairspring. This device controls the movement of the whole train of wheels and it therefore takes the place of the pendulum in a clock.

The escape wheel has fifteen hooks or teeth. The pallet is an anchorlike piece, with two horns so shaped that first one and then the other grips a tooth of the escape wheel. These horns allow only one tooth at a time to slip by. The pallet is fastened to a fork, which in turn is fastened to the balance wheel by means of a small disk called the roller. The roller pin alternately holds and releases the fork, thus allowing the escape wheel to turn and setting the entire train of wheels in motion. The balance wheel takes the place in watches that was once taken by the balance and the pendulum in clocks. It is made so that it balances perfectly, its weight being equally distributed throughout its circumference. The tiny screws on its rim are put in for this purpose and also to give the weight necessary for 18,000 vibrations an hour. The motion of the balance wheel is controlled by a fine hairspring of steel, which is fastened to the balance wheel. In most modern watches the tension in the hairspring can be regulated by a small lever. The entire movement of a watch is set between two metal plates, usually of brass, in which the wheels are fastened.

**Stop Watches.** The mechanism of a stop watch is like that of the ordinary watch, except that pressure on a spring is required to set the train of wheels in motion. In the simplest form the wheel which carries the seconds hand is released by a push on the stem of the watch. A second pressure stops the wheel, and a third



TRAIN OF WHEELS
Assembled in a row, to show more clearly their relation to one another.

pressure drives it back until the hand points to the zero. This last result is brought about by a cam which flies around when touched by the lever. All stop watches, no matter how complex, are elaborations of this simple device.

**Watch Manufacture.** The making of watches by hand seems to have originated in Germany about the year 1500. In that country, in Switzerland and in England, it received its highest development during the next three centuries, and Swiss watches especially have retained their reputation for excellence up to the present

time. Good watches were also made in France and Italy. About the beginning of the nineteenth century several attempts were made to establish a watch-making industry in the United States. Fifty years later the invention of machines for making the parts of watches gave opportunity for an industry on a new scale. The manufacture of watches is centered at Waltham, Mass., and other points around Boston and New York; one of the largest watch factories in the world is at Elgin, Illinois, and another almost as large is at Canton, Ohio. The annual production of watches and watch-cases in the United States has a value of over $25,000,000, and the industry employs about 15,000 men. Improvements in machinery have developed cheap watches, which are sold for a dollar or two; one famous dollar watch is manufactured in New Jersey. The parts are all stamped out with dies; no jewels are used, and little attempt is made to regulate the movement or to adjust the parts. These cheap watches often keep good time, but if any trouble develops it is almost useless to attempt repairs.

Improved machinery has made it possible to reduce the sizes of watches. From a thickness of one-half an inch or more watches have been reduced to one-fourth of an inch, and the diameter and weight have been reduced in proportion. The average weight of a man's watch is from three to four ounces; a lady's watch is sometimes but half as heavy.

The average man, woman or child who carries a watch has no idea of the delicacy of its works or the care and accuracy required in its manufacture. The smallest screws used in a watch have about 260 threads to the inch, and weigh about one two-thousandth of an ounce. The average hairspring is about twelve inches long, but it weighs only one one-thousandth of an ounce. The jewels used in watches are usually chips which the jeweler has discarded. The smallest jewels in a watch are in the ends of the horns of the pallet; 150,000 of them weigh a pound. An average watch is composed of about 150 separate pieces. All of these tiny parts are now made by machinery with greater accuracy and ease than was ever possible by even the most expert watch maker. W.F.Z.

Consult Glasgow's *Watch and Clock Making;* Saulnier's *The Watch Makers' Hand Book.*

**WATER,** a liquid which covers five-sevenths of the whole earth and is one of the most necessary substances for the maintenance of all life. It sprouts the seeds and feeds plants and animals; and without it man would die of hunger as well as of thirst. He should use two to three pints a day for drinking purposes; it is necessary to the life of the living cells of which the body is composed. It has been confined by man and pressed into service to furnish power for his mills and steam for his engines. It is estimated that from fifteen to fifty gallons a day are used for personal purposes for each person in civilized states.

For centuries water was considered an "element," but toward the close of the nineteenth century it was proved to be a compound of two volumes of hydrogen and one volume of oxygen, or by weight, two parts of hydrogen and sixteen parts of oxygen. Hence it is represented in chemistry by the formula $H_2O$. When perfectly pure, water is colorless, tasteless and odorless, but all natural waters contain impurities.

**Sources and Kinds of Water.** Of all natural sources the ocean is by far the most abundant, and from it, in fact, all other water is derived. The alkaline substances of its waters do not evaporate, and consequently the great stream of vapor continually rising from its surface, which is recondensed in colder regions, is free from all salt and impurities. Rain thus contains only those foreign substances which it derives from the atmosphere, and is the purest natural form of water. When it forms rivers, lakes and pools, the water contains solutions of the various substances existing in their beds. The fourth form in which water appears is in wells and springs, formed by water which has seeped through the earth and which contains solutions of mineral substances.

Since water absorbs noxious gases and is the most powerful solvent known, it easily becomes contaminated with organic matter, nitrates and ammonia, which render it dangerous to drink. The source of water for domestic use should therefore be at a distance from drains and sewers, and should be protected from surface water. Since lead is especially soluble in water, lead-lined cisterns and pipes should be avoided. The boiling of water to free it from impurities renders it flat to the taste, owing to the fact that all of the air has been driven out.

Water is said to be *hard* or *soft* according to the amount of bicarbonate of lime and magnesium salts in solution. The hardest waters are obtained from wells, lakes and some streams. Soft waters are preferable for washing purposes, since they more readily dissolve the soap, but the hard water is better for drinking.

**Physical Properties.** Although water is commonly spoken of as a liquid, it exists also in solid and gaseous forms. Water vapor is a normal component of the atmosphere, and when as much water has evaporated into the air as it is possible for it to hold the atmosphere is said to be saturated. Under ordinary atmospheric pressure water becomes a vapor at 212° F. (100° C.), and solidifies at 32° F. (0° C.). On mountain tops, where there is little air pressure, water boils at lower temperatures, and may reach a much lower temperature than 32° F. without freezing. See THERMOMETER; see, also, HEAT, page 2750.

The specific heat of water, or the amount of heat required to raise one gram of the liquid one degree, is greater than for any other substance except hydrogen; it is taken as 1, and is the unit of measurement of the specific heat of all other substances.

Another feature of water, important in physiography, is its exception to the general law of expansion by heat. It is at its greatest density at 39.2° F. (4° C.), when one cubic centimeter weighs one gram. When heated from the freezing point, it contracts until it reaches 39.2° F., after which it expands. Conversely, when cooled from 212° F., it contracts until it reaches 39.2° F., when it again begins to expand. This expansion with freezing is of great importance, for it keeps the ice on top of the heavier masses of water and thus prevents the solid freezing of lakes and ponds, which would cause the death of the animal life in their waters. On the other hand, it causes the bursting of water pipes and containers in freezing weather. The water formed when the ice is melting is of the same temperature as the ice itself, and the temperature of boiling water is not lower than that of the steam which it forms. E.B.P.

Consult Coles-Finch's *Water: Its Origin and Uses;* Fuertes' *Water and Public Health.*

**Related Subjects.** In connection with this article on water the reader may consult the following topics in these volumes:

| | |
|---|---|
| Boiling Point | Ice |
| Chemistry | Lake |
| Cloud | Mineral Waters |
| Dew | Ocean |
| Distillation | Oxygen |
| Erosion | Rain |
| Evaporation | River |
| Freezing | Snow |
| Frost | Spring |
| Hail | Steam |
| Humidity | Vapor |
| Hydrogen | |

**WATER BEETLE,** a name which includes several distinct families of beetles which inhabit the water. Some live permanent aquatic lives, and others live in or near the water only while in the larval (young) state. Typical examples of water beetles are the *whirligigs,* the *diving beetles* and the *common water beetles* of the ponds. Whirligigs dance and whirl on the water; they have short antennae, long, clawed front legs, paddle-shaped hind legs, and compound eyes, adjusted for vision above and below the water. Diving beetles are distinguished by their long, threadlike antennae and flattened, fringed hind legs, fitted for swimming. The common water beetles have short, club-shaped antennae and resemble the diving beetles in their habit of feeding on small fish and larvae; in common with the whirligigs, they have a receptacle for carrying air when diving into the water. Water beetles are well suited to aquarium life, and their habits afford interesting study.

**WATER BUG,** the general name applied to those families of bugs which have a permanent or temporary existence in the water. The most familiar are the *water boatmen,* the *back swimmers,* the *giant water bugs* and the *water skaters.* The complete life history of none of these species is known. Both water boatmen and back swimmers have long, flattened, fringed hind legs, which serve as oars; these insects feed on smaller water creatures and come to the surface for air; they lie dormant in the mud at the bottom of the water in winter. The eggs of the water boatmen are attached to the stems of vegetation; those of the back swimmers are deposited within the stems. The latter have the peculiar habit of swimming with the back downward. The giant bug seen whirling around electric lights in hot weather, casting great shadows on the ground, is a water bug that leaves its home in the water for short flying periods to find a mate or a new pool. Water skaters have long, spiderlike legs, and run nervously on the surface of the water. The beaks of all water bugs are to be avoided, as the sting is painful.

WATER BUG

**WAT'ERBURY,** Conn., one of the county seats of New Haven County, situated thirty miles north of Long Island Sound, on the Naugatuck River. It is thirty-three miles southwest of Hartford and ninety miles northeast of New York City, and is served by the New York, New Haven & Hartford Railroad and by a number of interurban lines. Since 1900 the city and town of Waterbury have been coextensive, and they cover an area of more than twenty-eight square miles. The population increased from 73,141 in 1910 to 86,973 in 1916 (Federal estimate).

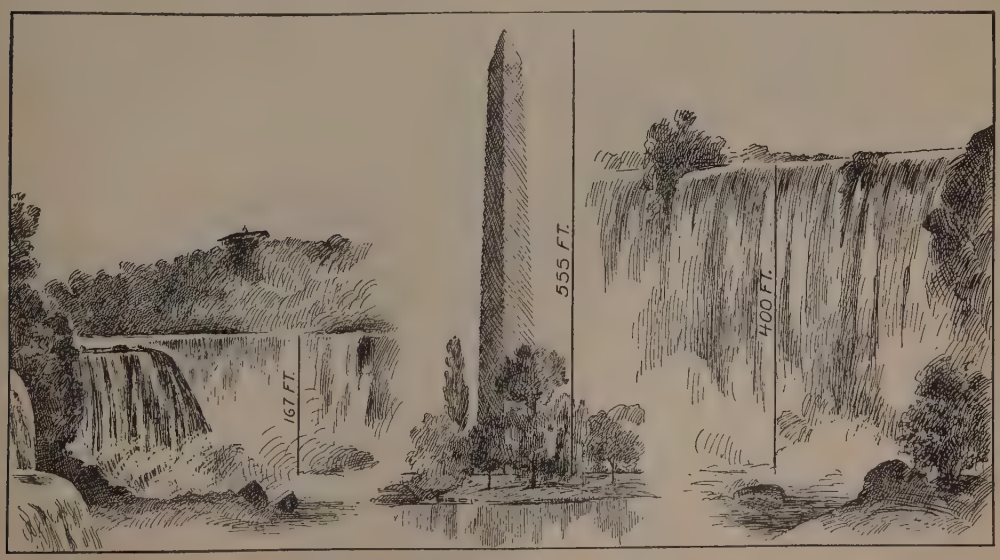
Features of interest are Hamilton and Chase parks, the Federal building, Bronson Library, the city hall, the Masonic Temple and the Soldiers' Monument. Educational institutions include Saint Margaret's Diocesan School for Girls, the Gerard School and the Convent of Notre Dame. The city has the Waterbury Hospital and the Southmayd Home for Old Ladies.

Waterbury leads the United States in the manufacture of brass and copper goods, sheet and rolled brass, castings and general brass ware. It is the home of the famous Waterbury watches, manufactured in vast quantities since 1879. Other manufactures include buttons, clocks, needles and pins, plated and Britannia ware, knitted goods and foundry and machine-shop products. About 1842 metals were plated at Waterbury for the making of daguerreotypes. The manufacture of brass goods, which is now the leading industry, began in 1802 with the making of brass buttons.

Waterbury, at first called Mattatuck, was settled in 1677 and was a part of Farmington until 1686. It was then incorporated, and the name was changed. In 1853 it became a city.

**WATER COLORS,** pigments prepared for the use of artists. These are made by mixing coloring matter which has been ground to a fine powder with water and a gum size or other adhesive substance. Water colors designed for use in painting pictures are usually made in the form of small cakes, which are rubbed down with water and applied with a brush to paper, ivory or other materials. Although water-color painting was known to the ancients before the introduction of oils, it was not until the nineteenth century, in England, that it first really became a rival of oil painting and its true scope and power were revealed. In recent years it has become the recognized medium of many eminent painters.

**WATERFALL,** the sudden descent of a stream from a higher to a lower level. In wearing down its channel a river uncovers certain layers of rock that are softer than others. If the hard rock is farther upstream than the soft, the channel below is worn more rapidly and a cascade or rapid is the result. Sometimes the hard ledge forms the margin of a vertical cliff over which the water plunges. If




SOME INTERESTING COMPARISONS

At the left and right, respectively, are Niagara Falls and the Victoria Falls. The sublimity of the latter spectacle can be imagined when its height is compared with that of the Washington Monument.

the volume of water is large a fall of this sort is called a *cataract,* as the cataract of Niagara; if the volume is small the fall may be called a *cascade.* Ordinarily the term *cataract* is applied to a series of rapids or falls caused by the flow of the stream over a rapidly-sloping rocky bed, such as the cataracts of the Nile and the Orinoco. A cataract which has a fall of but a few feet is termed *rapids.* Some of the most noted rapids in America are those at Sault Sainte Marie at the outlet of Lake Superior, and the rapids in the Saint Lawrence River. The most noted cataracts are Niagara, Victoria Falls on the Zambezi River in Africa, the falls of the Iguassú in South America and the Great Falls of Labrador.

Small waterfalls or cascades are often of great height. Such are the Yosemite Falls in California, 2,600 feet high; Monte Rosa, 2,400 feet, and the Staubbach of the Alps, 900 feet. Of lesser height but celebrated for their beauty are Montmorenci Falls, near Quebec, numerous cascades in the Rocky and Selkirk mountains, and the Upper and Lower falls in Yellowstone National Park.

Falls usually occur in mountainous countries, but sometimes they are caused by the descent of streams to a flood plain. The line along which several rivers flowing into the same body of water descends to this lower river is called the *fall line.* The fall line of the rivers south of Chesapeake Bay which flow into the Atlantic Ocean is marked by the location of manufacturing cities, of which Richmond, Raleigh, Augusta and Columbia are good examples.

**WATER LILY,** or **POND LILY,** the most gorgeous of water plants, is found throughout the north, south temperate and tropical zones. From the mud of clear, shallow water this plant sends long, stout stems; and up in the bright, uninterrupted sunshine, which it needs and loves, it appeals with its cool, green leaves and cup-shaped, showy-white, yellow, blue or red flowers. To most people the white blossom only is known. The leaves are round or oval, and are from two inches to over a foot in diameter; they float on the water like little flatboats for the frogs and water bugs. The flowers may be as small as one-twelfth of an inch or as large as a foot across. Some water lilies are hardy day bloomers; others are tender night bloomers, but each kind opens and closes its flowers at one particular time each day or night.

**WATERLOO,** *waw ter loo',* a town in the province of Ontario, three miles northwest of Kitchener, on the Canadian Pacific and the Grand Trunk railways. It is a manufacturing town, its products being principally furniture, boots and shoes, trunks, bags, bricks and tiles. Population, 1911, 4,359.

And near to the river's trembling edge
There grew broad flag-flowers, purple, prankt with white;
And starry river buds among the sedge;
And floating water lilies, broad and bright.
—SHELLEY: *The Question.*

**WATERLOO,** BATTLE OF, the battle that marked the close of the Napoleonic drama and resulted in the retirement of Napoleon from European politics and banishment to the rocky islet of Saint Helena. It was fought on June

MOUND OF THE LION
A British memorial at Waterloo, one of the numerous monuments on the battle field.

18, 1815, near Waterloo, a Belgian village lying about ten miles southeast of Brussels.

The British commander, Wellington, had fallen back towards Waterloo after two preliminary engagements on the 16th. The Prussians under Blücher had been defeated at Ligny, and Wellington's efforts to effect a junction

with his allies had been frustrated by Marshal Ney. He therefore retired and drew up his forces near Waterloo. The British position was in the shape of a curve, with the center nearest the enemy. On the 18th the French were seen to occupy a series of heights opposite, across a shallow valley from 500 to 800 yards in breadth. Wellington desired simply to hold his position until the arrival of Blücher, who had concentrated his troops at Wavre, some ten miles distant.

The opposing armies had not far from 70,000 men each. Napoleon's forces were composed of war-worn veterans, who added to simple loyalty motives of profound self-interest, for they were distrusted by the French party opposed to the emperor and many of them were practically dispossessed. Wellington had a mixed command composed of Belgians, Brunswickers, Hanoverians and English, many of them fresh levies.

The French opened the attack and maintained it during the entire afternoon, the action consisting of a series of brilliant but costly cavalry charges. Exhaustion had overtaken both armies by nightfall, when the arrival of reënforcements under Blücher heartened the allies. The battle then turned against the French, and Napoleon, in a last desperate effort to retrieve the day, launched the flower of his army, the famous Old Guard, against the enemy's position. This supreme effort failed, the allied army advanced in a bayonet charge, and the French were soon in full retreat, dispersed, utterly demoralized. Their loss amounted to about 35,000 in killed and wounded, while the allies lost about 23,000. The battle had the effect of removing forever from Europe the menace of Napoleon's great military genius and his boundless ambition.

Because of its part in deciding the fate of nations and because of its spectacular features, the Battle of Waterloo has found a large place in literature. Byron has a famous poem dealing with the subject, and Thackeray made use of it in his *Vanity Fair;* but the most famous literary treatment of it is in Hugo's *Les Miserables.* G.B.D.

Consult Becke's *Napoleon and Waterloo;* Creasy's *Fifteen Decisive Battles of the World.*

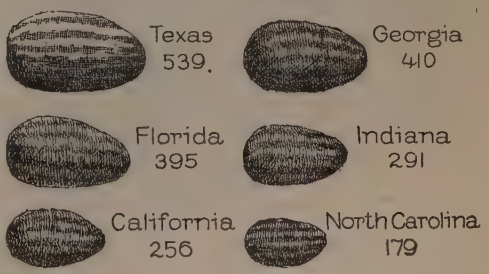
**Related Subjects.** The following articles in these volumes may be consulted in this connection:

Blücher, Gerhard Lebrecht von
Napoleon I
Ney, Michel
Wellington, Duke of

**WATERLOO,** Iowa, the county seat of Blackhawk County, is situated in the northeastern part of the state, fifty-three miles northwest of Cedar Rapids and 106 miles northeast of Des Moines. It is a rapidly-developing industrial city, whose population more than doubled between 1900 and 1910, in the latter year reaching 26,692; in 1916 it was 35,559 (Federal estimate). Railroad service is provided by the Chicago Great Western, the Chicago, Rock Island & Pacific, the Illinois Central, and electric interurban lines.

Waterloo is on the Cedar River, a wide stream at this point and spanned by several concrete bridges. Some of the most attractive parks of the city are along the river; these include Cedar River Park, which has a bathing beach and bathhouse, and Chautauqua Park, with a great coliseum. It is a popular convention city and has a number of fine hotels to accommodate convention guests. Other prominent public buildings are a Federal building, a courthouse, two Carnegie libraries and the Presbyterian and Saint Francis hospitals. Manufacture is the leading industry; among the leading articles made are gasoline engines, cream separators, farm implements and furniture. The surrounding country is agricultural and has extensive dairy interests. C.V.V.

**WATERMELON,** a fruit known for its cool and refreshing pulp before the Christian Era, was originally from tropical and Southern Africa, but is now grown as far north as Canada, and in every state of the American Union but




Figures Represent Thousands of Dollars

AVERAGE VALUE OF A CROP

Maine and New Hampshire. From ancient times it has been cultivated in Egypt and the Orient. Watermelons are grown from seed. They thrive in light, sandy loam, well drained and unshaded. A melon usually weighs from twenty to fifty pounds. Because of its tough rind it can be shipped in carloads without being crated. Texas, Georgia, Florida and Indi-

ana produce one-third of the watermelon crop of the United States, worth annually nearly five million dollars.

**WATER PLANTS,** or **AQUATIC,** *a kwat'ik,* **PLANTS,** a general name applied to any plants which live either wholly or partly in water. Some of these plants are rooted in the ground and grow through the water, raising

WATER PLANTS
Known also as hydrophytes and aquatic plants.

their leaves and blossoms above the surface. The leaves of some of these are very large, often attaining a diameter of six feet or more in tropic countries, and the flowers are sometimes very beautiful. Other plants remain almost wholly under water, the leaves in that case becoming small and more or less thread-like, while the flowers are far less showy. Many of the seaweeds and some plants in the inland waters are buoyed up by bladders that form on the leaves, and in a few species the plants break loose entirely from the earth and float about in the waters, from which they obtain their nourishment by means of their roots.

The water plants differ as much among themselves as do the land plants, and are found to belong to many families. Some of the best known among them are the beautiful white water lily, common on lakes and ponds; the water hyacinth, which spreads so rapidly that it sometimes blocks the channels of lakes and rivers; and the cat-tail or bulrush, which children soak in oil, light and use as a torch.

**Related Subjects.** The following water plants are given specific treatment in these volumes:

| | |
|---|---|
| Algae | Nelumbo |
| Bladderwort | Papyrus |
| Bulrush | Rush |
| Cat-Tail | Seaweed |
| Lotus | Water Lily |

**WATER PO'LO.** See Polo.

**WATER POWER.** Most of the large factories, mills and electric plants of the world are located on the banks of rapidly-flowing streams, because water power is much less expensive than any other for operating machinery. The establishment of the plant, which usually requires the construction of a dam and canals, or conduits, to convey the water to the wheels (see Water Wheel), may call for a large investment, but the expense of operation is much less than that of operating a steam plant of equal power. Moreover, many water-power sites have the advantage of furnishing power to several mills from the same dam, through the construction of canals leading from one plant to a second, from the second to a third, and so on down the stream. Plants so constructed are said to be arranged on the *cascade* plan. Excellent examples of this arrangement are found in Manchester, N. H.; Lowell and Fall River, Mass.; Rochester, N. Y.; Minneapolis, Minn., and in many other large manufacturing centers.

**How Measured.** Theoretically, water falling from a higher to a lower level exerts a power equal to the weight of a column of water as high as the distance from one level to the other. To illustrate: a cubic foot of water weighs 62.5 pounds; therefore a column of water two feet in width, one foot from front to back and ten feet high would weigh 1,250 pounds, and at its base it would exert a pressure of 1,250 pounds. If this water is allowed to flow against the buckets of a water wheel, it will cause the wheel to revolve with sufficient force to operate light machinery.

The actual power developed, however, is always less than that theoretically estimated.

Some power is lost by friction of the water on the conduit and some by failure of the wheel to utilize all the power exerted by the water. Because of mechanical difficulties no water wheel has ever been constructed that can use all the power applied to it. The best wheels use from seventy to eighty per cent, and occasionally as high as ninety per cent, but the ordinary wheels use but little more than half of the indicated power.

The horse power—a force that will raise 33,000 pounds one foot in one minute, or 550 pounds one foot in one second—is the unit employed in measuring water power. To estimate the horse power of a waterfall or rapid, multiply the flow in cubic feet per second by the height of the fall in feet, and this product by .1134. According to this rule a fall fifty feet high and having a flow of 500 cubic feet per second would develop $50 \times 500 \times .1134$, or 2,835, horse power.

**Classification of Water Powers.** Water powers are classified according to the height of the fall, which is called the *head*. Those having a fall not exceeding 100 feet are known as *low-head;* those whose fall is between 100 and 350 feet are called *medium-head,* and those having a head of over 350 feet are *high-head* powers. Some high-head powers have a fall of over 5,000 feet. Since the power depends upon both the head and the flow, low-power plants require a large volume of water.

**Development of Water Power.** Streams are the most available sources of water power, and most of the great water-power plants are those of the low-head class. The head is usually increased by the construction of a dam across the stream, and the conduits leading to the wheels carry large volumes of water. The largest and most modern plant of this type in the United States is that at Keokuk, Iowa (which see). The great plant at Niagara is of the medium-head class. Here the power was obtained by sinking the wheel pits to the level of the river below the fall and conveying the water to the wheels through penstocks.

Plants of the high-power class are found in mountainous regions, where dams for impounding the water of small streams are constructed at levels from several hundred feet to thousands of feet above the location of the wheels, to which the water is conducted by iron pipes. Power plants of this type have a high head and a small volume of water. The height of the head compensates for the volume of water, but such plants require a special type of water wheel. They are extensively employed in the production of electric power, which is often conveyed long distances by wire before it is used.

The rapid increase in the use of electricity has led to the reconstruction of many old water-power plants, as well as to the development of new ones in localities that formerly were not available, because of their distance from centers of manufacture. Moreover, the extensive application of electricity to the operation of public utilities, especially to the lighting of cities and the operation of street cars and interurban railways, has been the means of consolidating many large power plants under the control of great corporations. Many valuable water-power plants in the United States are on lands belonging to the national government and are under the control of the Department of the Interior and the Department of Agriculture, respectively. While some of these sites have been leased, it is the policy of the government to prevent their falling into the hands of monopolistic corporations. The water-power sites of Canada are under the control of the Dominion government.

**Water Power of the World.** Only a part of the water power of the world has been estimated, and but a small portion of that known has been developed. Tremendous possibilities lie open to future generations.

*United States.* The water power of the United States is estimated at 30,000,000 horse power. Of this only fourteen per cent, or 4,200,000 horse power, has been developed. Could all the water power of the country be made available it would be more than sufficient to operate every factory, mill, electric plant and railway in the country.

*Canada.* The Canadian rivers are credited with a water power equivalent to about 18,000,000 horse power. Only a little over seven per cent of this has been developed, showing that there is an abundance for the industrial growth of the Dominion.

*Europe.* The water power of Europe is estimated at 41,000,000 horse power. Notwithstanding the fact that for centuries manufacturing has constituted an important line of industry in many European countries, only a little over ten per cent of this power has been developed.

*Other Parts of the World.* No estimates of the water power of Asia, Africa and South America have been made, but it seems safe to consider that these continents possess water

power at least equal to that of Europe and North America combined.

**Power in Waves.** The waves of the sea exert almost unlimited power, and could some device be found for using this power in operating machinery the expense of many manufacturing processes might be reduced. For years inventors have been working on motors that will transform the energy of the waves into mechanical motion, and such progress has been made as to lead to the belief that in the future a successful motor of this sort will be invented.

Consult Merriman's *Treatise on Hydraulics;* Lyndon's *Development and Distribution of Water Power.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Aqueduct | Keokuk, Iowa |
| Conservation | Niagara Falls and River |
| Dam | Turbine Wheel |
| Hydrostatics | Water Wheel |

**WAT'ERPROOFING,** a method of treating cloth, leather, wood and other substances so that they will shed water. One of the most common forms of waterproof garment is the mackintosh. Woolen and other goods are rendered waterproof in one of several ways. Sometimes they are saturated in soapy water, then immersed in a bath of alum, and finally in solutions of gelatin and galls. In another process the fibers of the cloth are similarly treated before they are woven. A third process consists in treating cloth with a solution of rubber, so that in the finished product the layer that turns the water lies between an outer and an inner surface of cloth. The mackintosh is thus made, and while it turns water, it also keeps out the air that the body needs, so that it is not healthful for constant wear.

The Japanese make waterproof paper umbrellas by dipping paper in a solution of potassium dichromate and glue. In Western countries, a solution of shellac in borax is substituted. Leather is treated in a bath of hot, melted paraffin.

**WATER PURIFICATION,** *pu ri fi ka' shun.* See FILTER.

**WATERSHED,** a term sometimes applied to the crest of land which separates the headwaters of two different river systems. Such a water parting is more often called a *divide,* and is described in these volumes under that heading, page 1812. The name *watershed* is a compound of *water* and *shed, shed* in this instance retaining its obsolete meaning of *part* or *divide.* It is interesting to note that this is the only example of the use of *shed* with its ancient meaning.

**WAT'ERSPOUT,** a whirling column of air extending from a cloud to the surface of lake or ocean, rendered visible by the water or vapor it carries. A waterspout is caused by a strong upward draught of air under a cloud. The air acquires a rapid rotary motion as it ascends, and an area of low pressure is produced in the center. Humid air rushing into this low-pressure area is rapidly cooled and becomes visible as vapor. Thus, although waterspouts may draw up some water from the sea near their base, the greater part of the water they contain is fresh water. Water often falls in great volumes on vessels passing through waterspouts, but the danger they threaten is from the violently whirling wind and not from the water. Waterspouts are generally dissipated after a few moments, like the dust whirls one may see in city streets. See WHIRLWIND.

A WATERSPOUT

All drawings of waterspouts are likely to be more fanciful than they are representative of actual conditions. Solid columns of water such as the picture suggests seldom form; the substance is cloud, or spray, or both.

**WATERTOWN,** MASS., a residential and manufacturing town in Middlesex County, six miles west of Boston, on the Charles River and on the Boston & Maine Railroad. In 1910 the population was 12,875; in 1916, 14,867 (Federal estimate). Interesting features of the town are the state arsenal and public library. There are manufactories of paper and paper bags, woolen and rubber goods, waste and shoddy, starch, stoves and furnaces. Watertown was settled in 1630 and was incorporated the same year. It was the first American town to protest against arbitrary taxation, and did so when a levy was collected to build a fort at Cambridge. In 1775 and 1776 the second and third provincial congresses met in Watertown. Many colo-

nists driven by the British from Boston made their homes here.

**WATERTOWN,** N. Y., the county seat of Jefferson County, is situated on the Black River, seventy-three miles north of Syracuse, ten miles east of Lake Ontario and nineteen miles southeast of the Thousand Islands of the Saint Lawrence River. Transportation is provided by the New York Central Railroad. The population in 1910 was 26,730; in 1916 it was 29,894 (Federal estimate).

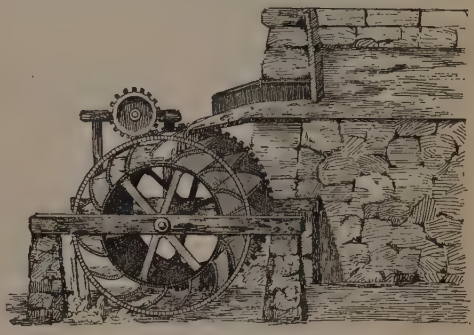
Interesting features of the city are a Federal building, completed in 1900 at a cost of $100,000; a $250,000 Y. M. C. A. building, a Masonic Temple, and the Roswell P. Flower Memorial Library, built by Mrs. E. Flower Taylor in honor of her father, at one time governor of the state of New York. City Park contains about 600 acres. There are two hospitals, also homes for the aged and for orphans. The city is the center of one of the most productive dairying regions in the United States. The average annual cheese sales of the Watertown Produce Exchange amount to $1,500,000. The city is named from its water power, and has large paper and pulp mills and manufactories of air brakes, farm implements and lumber.

Watertown was settled in 1800. It was made the county seat five years later, and was incorporated in 1816. A city charter was granted in 1869, and in 1918 the commission plan of government became effective. F.H.L.

**WATERVILLE,** ME., a city in Kennebec County, in the southwestern part of the state, about eighty miles northeast of Portland, and eighteen miles north and east of Augusta, the state capital, with which it is connected by an interurban line. Waterville is on the Kennebec River, a navigable stream, and is served by the Maine Central Railroad. It is the seat of Colby College (Baptist) and of Coburn Classical Institute, and has a Carnegie Library. The city has large railroad shops. Water power obtained from the river is used in the manufacture of cotton and woolen goods, iron products, furniture and carriages. The city has tanneries and cigar factories, and across the river, at Winslow, are large paper and pulp mills. The place was settled in 1764, and was a part of Winslow until separately incorporated in 1802. The population in 1910 was 11,458, and 12,702 in 1916 (Federal estimate).

**WATERVLIET,** N. Y., a city in Albany County, located on the Hudson River opposite Troy. It is connected with Troy by ferry and bridge, and is served by the Delaware & Hudson Railroad. In 1910 the population was 15,074; in 1916 it was 15,546 (Federal estimate). In Watervliet there is a mammoth United States arsenal, dating from 1807. Besides the war materials manufactured in this plant, the city produces iron and lumber products, wagon and automobile specialties, harness, collars and cuffs and woolen goods.

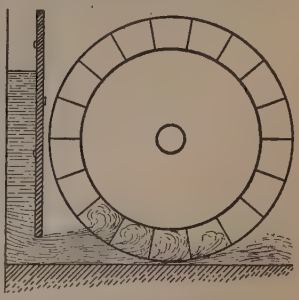
**WATER WHEEL,** a device for utilizing the power of falling water for mechanical purposes. The water is guided from a stream or overflow sluice to the wheel by means of a chute, so it exerts its force chiefly by its weight and partly



AN OVERSHOT WHEEL

by impact. The wheel is similar in principle to the paddle wheel of a steamer, and revolves on a horizontal axle which is connected by belts or gearing with whatever machinery it is intended to operate. The substitution of iron for wood in the construction of water wheels has led to many improvements.

There are several different kinds of water wheels, but they can be divided into two classes, the vertical and the horizontal. The horizontal wheels include the turbine, which is fully described under its own title. The vertical wheels include the two most familiar types, the overshot and the undershot, which are described below.



UNDERSHOT WHEEL
Diagram shows application of power.

**Overshot Wheel.** This is a water wheel having a series of buckets around its circumference, so arranged that the stream of water falls on the wheel just above its center. The weight as well as the inertia of the moving water sets the wheel into rotation.

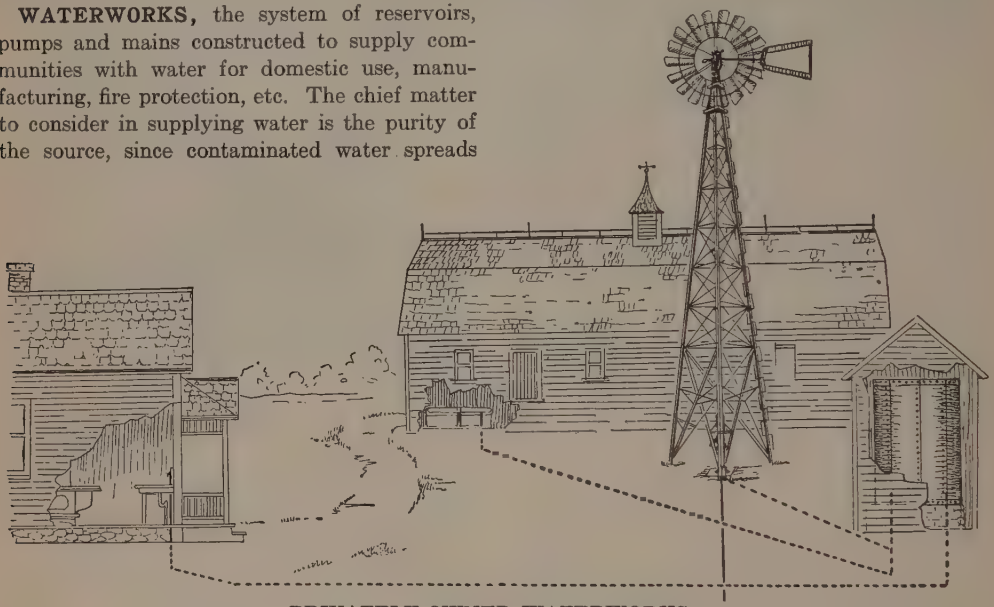
When the full buckets reach the bottom, the water flows out; the ascending buckets are thus empty, while those descending are filled.

**Undershot Wheel.** This is a water wheel so set up that the current of flowing water strikes against the buckets, or paddles, of the wheel at the bottom. This wheel uses only the momentum of the flowing water, and its efficiency is so low that it has been but little used.

Both of these types have been replaced by the turbine, and they are seldom seen. See WATER POWER.

**WATERWORKS,** the system of reservoirs, pumps and mains constructed to supply communities with water for domestic use, manufacturing, fire protection, etc. The chief matter to consider in supplying water is the purity of the source, since contaminated water spreads disease. If water is not free from dangerous impurities, especially such as are deposited by sewage, it must be filtered or treated chemically. Large cities situated near rivers or large lakes usually draw upon them for their water supply, while small communities removed from such facilities rely on wells, tapping underground water. When water is taken from rivers or lakes it may be pumped directly through conduits and mains to the consumer or stored in reservoirs and distributed at need. When the source of supply is wells, the water is usually pumped into reservoirs of masonry, or wrought-iron or steel standpipes, set on masonry foundations.

Water is forced through the main either by gravitation, the source being higher than the place of distribution, or by pumping. The new water system of New York is a good illustration of the gravitation system. A huge aqueduct of concrete will tap a series of reservoirs in the Catskill Mountains, so much above the level of the city that the water will mount to the twentieth story without pumping. In Chicago, on the contrary, the water is driven by pumps. It is drawn through tunnels from far out in Lake Michigan (two or four miles), and is forced through the mains by twelve pumping stations. Such cities as rely on gravitation, however, often supplement it with a pumping system in order to supply the pressure required for fighting fires. In the district topped by its lofty "skyscrapers," New York maintains a separate system, the water being driven through the mains under great pressure from pumps.



PRIVATELY-OWNED WATERWORKS

The windmill is the pumping station; the farmer easily provides a standpipe sufficiently high to force a stream of water into house and barn.

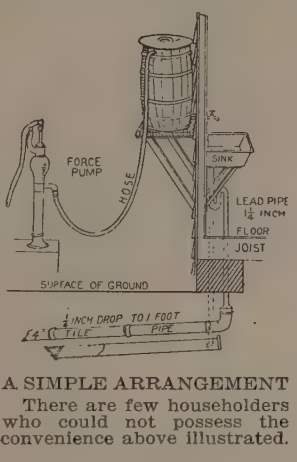
From the source of supply water is conveyed by means of conduits, mains and numerous radiating branches of diminishing diameter to the consumer. The mains are of cast iron or steel and have a diameter of from four to forty-eight inches, occasionally more. The mileage of water pipes in great cities is naturally very large; Chicago, for example, has 2,750 miles of pipes—almost enough to stretch from New York to Spokane.

The consumption of water per person in American cities is vastly greater than in those of Europe; from 200 to 250 gallons a day for each person is not uncommon. This large con-

sumption is regarded as excessive and the result of waste. New York uses about 100 gallons a day for each inhabitant, but the consumption in Chicago in 1914 was 254.2 gallons per capita. The water pumped daily in Chicago amounts to 613,323,616 gallons, a total considerably in excess of the New York consumption, due to a great extent to its vast industrial territory.

As regards ownership, the tendency has been for cities to assume charge of water supply, though in a considerable number of American cities private ownership still obtains. The cost of construction and maintenance is necessarily great. New York, for example, spent a sum exceeding $177,000,000 in building its new system.

**Home-Made Water Supply.** The dweller in an agricultural community is demanding to a large degree the conveniences once enjoyed by his city neighbor exclusively. He has discovered that a system of waterworks for his house, barn and dairy can be had at very moderate expense, with practically no expense for upkeep when once installed. His windmill serves as a pumping station. A reservoir with a water level less than ten feet above ground will assure a flow of water into all rooms on the first floor of his dwelling. If he elevates the reservoir twenty-five feet above the ground the pressure is sufficient to supply running water to the second floor. By a little additional piping and stove attachments both hot and cold water are at the command of the housewife. The diagram herewith shows how one farmer lightened the labor in house and barn.




A SIMPLE ARRANGEMENT
There are few householders who could not possess the convenience above illustrated.

Lacking a windmill, the familiar hand pump can be brought into service to provide an unfailing supply of fresh water to the kitchen in the village or on the farm. A barrel will serve as the reservoir; it need be placed only a little higher than the faucet to give pressure sufficient for all culinary purposes. G.B.D.

Consult Russell's *Public Water Supply;* Folwell's *Water Supply Engineering.* For illustration of a portion of New York's water system, see halftones facing pages 306-307. On page 3505 is a drawing which shows the distance from which Los Angeles secures its water supply.

**WATROUS,** *wah'trus,* a town in the south-central part of Saskatchewan. It is the first division point east of Saskatoon, on the main line of the Grand Trunk Pacific; it is fifty-nine miles east of Saskatoon, 385 miles northwest of Winnipeg and 408 miles southeast of Edmonton. Watrous has a $35,000 school building, several grain elevators, a machine shop and a dump rock company. The municipal water and sewage systems were completed in 1915. Electric light is furnished by a private company. Manitou Lake, three miles distant, is becoming known as a tourist and health resort. Population in 1911, 781; in 1916, estimated, 1,500.

**WAT'SON,** JOHN (1850-1907), an English author and clergyman, best known by his pen name of IAN MACLAREN. He was born at Manningtree, Essex, of Scotch parents, and was sent at the age of sixteen to Edinburgh University, where Robert Louis Stevenson and Henry Drummond were his classmates. After studying for the ministry at New College, Edinburgh, and at Tübingen, he served as assistant at the Barclay church, Edinburgh, and in 1875 became minister of the Free church at Logiealmond. This little town, the "Drumtochty" of his works, gave him the scene for many of his stories.

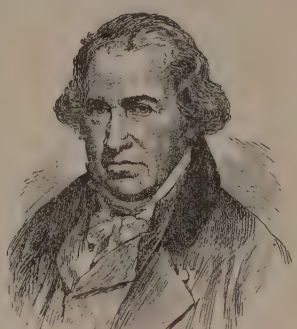
In 1877 Watson accepted a call to be assistant to Dr. Miller in Free Saint Matthew's, Glasgow, and three years later went to Sefton Park Presbyterian church in Liverpool, where he won a reputation as a pulpit orator. He is best known, however, for his collection of stories of Scotch life called *Beside the Bonnie Brier Bush,* which was published in 1894 and became at once very popular. The other works published under his pen name include *The Days of Auld Lang Syne, Kate Carnegie* and *A Doctor of the Old School;* while under his own name he produced *The Mind of the Master, The Upper Room, The Potter's Wheel* and *The Life of the Master.* Watson delivered the Lyman Beecher lectures before the Yale Divinity School in 1896. It was during a trip to the United States that he died, at Mount Pleasant, Iowa.

**WATSON,** THOMAS E. (1856- ), an American lawyer, journalist and political leader, who obtained the first appropriation in Congress for the free rural delivery of mail. He was born in Columbia County, Ga., studied law

and was admitted to the bar in 1875, and began the practice of his profession at Thomson, Ga. In 1882 he was elected to the state legislature as a Democrat, and in 1888 served as Democratic elector-at-large. He was active in the movement of the Farmers' Alliance, and later affiliated himself with the People's, or Populist, party. For a time he edited a Populist paper in Atlanta, and in 1890 was elected to Congress on the Populist ticket. It was while he was in Congress that he secured the appropriation for rural free delivery. In 1904 he was the candidate of the People's party for the Presidency of the United States. Since 1906 he has published *Watson's Jeffersonian Magazine* and *The Weekly Jeffersonian.* He was nominated for the Presidency by the Populists again in 1908, and polled a popular vote of about 90,000. His published works include *The Story of France, Life of Thomas Jefferson, Life and Speeches of Thomas E. Watson, The Roman Catholic Hierarchy* and *The House of Hapsburg.*

**WATT,** *waht,* in electricity, a unit for measuring power, or the rate at which the current works. A watt is equal to the pressure of one volt, with a flow of one ampere per second. The kilowatt, 1,000 watts, is the unit usually employed; 746 watts equal one horse power. See AMPERE; VOLTMETER; ELECTRIC METER.

**WATT,** JAMES (1736-1819), a Scottish engineer, born at Greenock, and generally referred to as the inventor of the steam engine, although such is not really a fact; his fame rests upon improvements in the early crude engines which rendered them practicable. His father was a carpenter and merchant, and the child early acquired a taste for constructing ingenious devices out of wood and metal, as well as for mathematics and reading in general. He went to London to learn the trade of mathematical instrument maker, and in 1756 removed to Glasgow. Failing at first to establish himself independently, he allied himself with the university, but in 1760 decided to give up all his time to independent work.



JAMES WATT

Four years later Watt had an opportunity to experiment with a Newcomen engine which he was repairing, and he set to work to plan a device whereby loss of heat in the cylinder could be avoided, and to correct the imperfect method of condensing the steam. He soon constructed an engine of his own, and in partnership with Matthew Boulton, a manufacturer of Birmingham, removed to Soho. There they started the establishment which was soon to be famous all over Europe. The first steam engine constructed along modern lines was completed in 1774. In 1800 he withdrew from active business, the patent then expiring which he had held for twenty-five years. His two sons carried on the business which he and Boulton had begun, and Watt died at Heathfield, in Staffordshire, on August 25, 1819.

Watt was made a fellow of the Royal Societies of Edinburgh and London, was a corresponding member and then a foreign member of the Institute of France, and in 1806 was honored with the degree of LL.D. by the University of Edinburgh. A national monument was placed in Westminster Abbey, and a statue by public subscription was erected at Birmingham. He possessed a remarkable memory, and when not occupied in researches in the practical sciences he was engaged in reading along the lines of law, philosophy, music, architecture and chemistry.

Among his other inventions are a fuel-saving furnace, a machine for reproducing sculpture, a copying press and copying ink, and numerous instruments for use in the practical sciences. He discovered independently the chemical composition of water. His researches were unusually varied, and his contributions to science easily place him with the foremost inventors the world has known.

There is a persistent story that the idea of the steam engine came to Watt as a boy while watching the power of steam in his mother's tea-kettle. By plugging up the spout he blew the lid off. Whether the story has a basis of fact his biographers are silent. A.MC C.

On page 5539 is an illustration, "Watt Discovering the Power of Steam." Consult Muirhead's *Life of Watt;* Thurston's *Growth of the Steam Engine.*

**WATTEAU,** *vah toh',* ANTOINE (1684-1721), a French painter who was without an equal in his day in the portrayal of the manners, graces and dress of fashionable society. He interpreted with wonderful skill the spirit of Court life during the reign of Louis XIV. Watteau

was born at Valenciennes, of poor parents, and had to struggle not only against poverty but ill health, to get a start in life. Hungry and lonely, he drifted to Paris, where, his talent once recognized, he soon became prosperous; in fact, he was so popular that the people walked, dressed and danced *à la Watteau.* In 1717 he was received at the Academy and was enrolled as Court painter of pleasure parties, masquerades, etc. He was a favorite of Frederick the Great of Prussia, who possessed a large collection of his works. His paintings, executed in delicate tints, are noted for their elegance and grace. His most famous work is *The Embarkation for the Island of Cythera,* in the Louvre.

**WATTERSON,** Henry (1840- ), the best-known Southern newspaper editor, was born at Washington, D. C. He was privately educated, and at the age of twenty years began newspaper work as an editorial writer for the Washington *Star.* He joined the Confederate army at the outbreak of the War of Secession, but was discharged in 1862 that he might edit a Confederate journal, the *Rebel,* published at Chattanooga, Tenn. In 1864 he returned to the army and became chief of scouts under General Johnston. He went to Nashville, Tenn., after the war and revived an old paper, the *Republican Banner.* He left this successful work in 1867 to become editor of the Louisville *Journal,* which he soon consolidated with the *Courier;* under his editorial direction the *Courier-Journal* became one of the most influential papers in America.

HENRY WATTERSON

As a lecturer and political speaker he is noted for his picturesque phrasing and vigorous and accurate statements. His ability as editor and speaker made him a power in national politics as early as 1872, and from that year until 1892 he was a delegate-at-large to every Democratic national convention. From 1876 to 1878 he was a member of Congress, but after serving one term refused every offer of political honors. Few men in the Southern states were more conspicuous in advocating a thorough reconciliation of the North and the South. While author of numerous essays and sketches, his only works in book form are *Oddities of Southern Life and Character, History of the Spanish-American War, Abraham Lincoln* and *The Compromises of Life.*

**WATTS,** George Frederick (1817-1904), the "poet-painter" of England, who did more than any other artist of the century to raise portrait painting to a high plane of excellence. He was also a great moral painter and prophet. He saw in all things the image of divinity, and with this spirit he painted his symbolical studies, *Watchman, What of the Night?, Life's Illusions, Love and Death, Hope,* etc. Death in his paintings does not appear in the guise of a skull, but as a majestic figure clad in white, with face averted as if deploring her errand; for Watt sought to dispel the notion that death was the greatest of all terrors. His historical paintings, landscapes and numerous sculptural pieces were conceived on the same lofty plane as were his symbolical studies.

He was born in London. When a young man he married Ellen Terry, the English actress, then only seventeen years of age. This marriage proved unhappy, and it was soon annulled. Miss Terry was the model for Sir Galahad, which Watts presented to Eton College (see page 2360). This picture now hangs in the college chapel.

As Watts was a man of wealth, he never executed his famous pictorial moralities for money; these he presented to various cities. To America he sent a replica of *Love and Life,* now in the White House, Washington; to the city of Manchester, England, he gave his *Love and Death,* and to Munich, Bavaria, *The Happy Warrior.* He executed gratuitously a fresco of Saint George, now in the House of Parliament, and he decorated the dining hall of Lincoln's Inn. He gave over 150 portraits, including those of Carlyle, Tennyson, Matthew Arnold, Browning, Millais and Sir Frederick Leighton, to England for the National Portrait Gallery in London.

Tennyson once asked Watts to describe his notion of what a true portraitist should be, and the painter's reply so pleased the poet that he embodied it in his *Idylls of the King:*

> As when a painter, poring on a face
> Divinely, through all hindrance, finds the man
> Behind it, and so paints him that his face,
> The shape and color of a mind and life,
> Lives for his children, ever at its best.

Consult Chesterton's *G. F. Watts;* Barrington's *G. F. Watts: Reminiscences.*

**WATTS,** Isaac (1674-1748), a remarkable English preacher and hymn writer, born at Southampton. He was a student from his childhood, beginning Latin at the age of five; and when he was sent to London to school he applied himself so closely to his work that he permanently injured his health. At the age of twenty-two he began tutoring in a family, where he remained for six years, and in 1702 he became minister of the Independent Church in Mark Lane, London. Here he gained the reputation of being one of the best preachers of his time. After a very serious illness in 1712 he went to Abney Park, the estate of Sir Thomas Abney, at Theobalds, and made that place his home for the remainder of his life. He wrote various theological works, which are now nearly forgotten, but many of his hymns retain their popularity to the present day. "Jesus shall reign where'er the sun," "O God, our help in ages past," and "There is a land of pure delight" are among those best known, while "When I survey the wondrous cross" is accounted by no less a critic than Matthew Arnold the finest hymn in the English language. Of his *Divine and Moral Songs for Children,* "How doth the little busy bee" was for many years very popular.

**WAUKEGAN,** *waw ke'gan,* Ill., the county seat of Lake County, situated in the northeast corner of the state, thirty-six miles north of Chicago and fifty-two miles south of Milwaukee, Wis. It is on Lake Michigan and has a good harbor, which has been improved through government appropriations. There is passenger and freight boat service to Chicago, Milwaukee and other lake ports, and rail transportation is provided by the Chicago & North Western, the Elgin, Joliet & Eastern and by interurban lines. In 1910 the population was 16,069; it was 20,244 in 1916 (Federal estimate).

Waukegan occupies an attractive hilly and wooded site. South of the city is the Great Lakes Naval Training Station. On Sheridan Road, a famous automobile boulevard, is the Bowen Country Club, the summer camp of Hull House, Chicago. Waukegan has a Federal building, a county courthouse, Carnegie Library, county and private hospitals and the Masonic Temple. The surrounding country is agricultural, and brings the city a large trade. There are manufactories of steel wire; hardware, including locks and motors; women's garments, boats and doors; and the city also contains tanneries, foundries, a sugar refinery and brass and iron works. Waukegan was incorporated as a village in 1849 and became a city in 1859. In 1911 the commission plan of government was adopted. P.W.

**WAUKESHA,** *waw'ke shaw,* Wis., the county seat of Waukesha County, is a popular summer resort whose medicinal springs attract many visitors. It is in the southeast corner of the state, seventeen miles west of Milwaukee, on the Little Fox River and on the Chicago & North Western, the Chicago, Milwaukee & Saint Paul and the Milwaukee, Saint Paul & Saulte Sainte Marie railroads. Electric lines run to Milwaukee and Watertown. The population in 1910 was 8,740; in 1916 it was 9,570 (Federal estimate). Features of the city are Carroll College (Presbyterian), the State Industrial School for Boys, a courthouse, public library, the Waukesha Springs and Rest Haven hotels, and parks. The principal industry is the bottling and shipping of mineral water from the springs. The city also has structural steel works, steel-bridge and malleable-iron works and a canning factory. Waukesha was settled in 1836, was incorporated in 1848, and became a city in 1896.

**WAUSAU,** *waw'saw,* Wis., a city and the county seat of Marathon County, situated in the north-central part of the state, 180 miles northwest of Milwaukee and ninety-three miles northeast of Eau Claire. It is on the Wisconsin River and on the Chicago & North Western and the Chicago, Milwaukee & Saint Paul railroads. In 1910 the population was 16,560; in 1916 it was 19,239 (Federal estimate). Wausau is the commercial center of a fine lumbering, agricultural and dairying community. In the vicinity are large granite quarries. Manufacture is promoted by the Big Bull Falls, and the leading products are lumber and lumber products, furniture, sawmill machinery, sandpaper, veneer, leather, toys, canned vegetables and flour. Prominent features of the city are a large natural park, a courthouse and a public library. Wausau is the seat of the Marathon County Training School for Teachers and the County School of Agricultural and Domestic Science, and has the county asylum for the insane. The place was settled about 1850, and was chartered as the city of Wausau in 1872.

**WAVES,** undulating disturbances passing from particle to particle throughout an elastic substance. The most familiar form of wave is that seen on the surface of a body of water. Such waves are produced by the friction of the wind. The wind, in its passage, lifts separate particles of water, which the pull of gravitation

draws back again. Thus, they are caused to vibrate rhythmically. To the eye, it seems that the water moves forward, but this is not true. The separate particles of water, instead of advancing with the advancing wave, simply rise and fall on the same spot. This fact may be shown by tossing a light substance into a pool whose surface is ridged with waves. It will alternate between the crests and the hollows, but will not be borne forward by the passage of the wave. Even the greatest and most powerful waves, such as those in the sea and the Great Lakes, do not cause water to move forward with their motion. Not all waves are visible, like those that travel over the surface of liquids. Sound, heat and light, for example, are propagated in waves that are invisible and are known only by their results. These waves reach the senses from some body which is struck or otherwise agitated. See SOUND; HEAT; LIGHT.

**WAX,** a solid, easily melted substance obtained from various animal, vegetable and mineral sources, and used extensively for commercial purposes. The most common variety is *beeswax,* secreted and used by insects to build their cells. It is yellow and has a honeylike odor, but when purified and bleached becomes white, odorless and tasteless. Certain kinds of bark lice, particularly the *Chinese wax insect,* secrete a similar wax. Upon the leaves of a number of plants, among them the *wax palm,* a varnishlike substance is found, from which fine waxes and lacquers are made. Bayberry candles are made from the wax which covers the berries of the candleberry, or wax myrtle. *Paraffin wax,* which has dozens of practical uses, is obtained from a distillation of petroleum. *Spermaceti,* extracted from the oil taken from the whale, is largely used as an ingredient in toilet creams. *Wool wax,* the sweat of the sheep, is obtained in the wool-washing process. It is a dark brown substance with a disagreeable odor, and is used as a dressing for leather goods.

Wax, in all its varieties, is insoluble in water, but dissolves slightly in alcohol and ether. At about 80° it softens and can be easily molded, while at 145° it melts.

**Related Subjects.** The more important kinds of wax, and their properties and uses, are discussed in these volumes under the following headings:

Beeswax
Candleberry
Paraffin
Sealing Wax
Spermaceti

**WAX MYRTLE,** *mur't'l,* or **WAX TREE.** See CANDLEBERRY.

**WAXWING,** a beautifully-tinted, soft-plumaged bird with a high, pointed crest, a band of yellow across the end of its tail, and red, waxlike drops on its wing feathers. The familiar *cedar waxwing* is found throughout North America, nesting as far north as Labrador and Southern Alaska. It is commonly seen in small flocks, which fly quietly about and feed on berries and fruits, or dart from some high perch for insects, in the manner of flycatchers. The birds build a bulky nest in fruit or shade trees. The eggs are three to five in number, of a pale bluish-gray or putty color, speckled with black. The *Bohemian waxwing,* a slightly larger bird, is found in far northern latitudes in both hemispheres, nesting within the Arctic Circle. In winter it appears in the United States as far south as Kansas.

**WAY'CROSS,** GA., the county seat of Ware County, situated in the southeastern part of the state, about sixty miles from the Atlantic Ocean. Jacksonville is fifty-seven miles southeast, and Savannah is ninety-seven miles northeast. The city is served by the Atlantic Coast Line, the Atlanta, Birmingham & Atlantic, the Waycross & Southern and the Waycross & Western railroads. In 1910 the population was 14,485; in 1916 it was 19,869 (Federal estimate). Waycross is the center of a fertile agricultural section in which are grown cotton, fruit, live stock, pecans and sugar cane, excellent syrup being made from the last-named product. There is an abundance of timber, and consequently the city has large sawmills, cabinet works, shingle and lath mills, turpentine plants, and one of the largest cypress sawmills in the South. It also has the largest railway car and repair shops in this section of the country, those of the Atlantic Coast Line. The county courthouse, post office, Bunn office building, a high school and the Y. M. C. A. quarters are noteworthy buildings. In addition to the public schools, the city has Bunn-Bell Institute, under Baptist supervision. M.V.C.

**WAYNE,** *wane,* ANTHONY (1745-1796), an American patriot, called "Mad Anthony" Wayne because of his reckless bravery. He was the hero of one of the most daring attacks of the Revolutionary War, the recapture of Stony Point. Wayne was born in Easton, Pa. He served in the Pennsylvania legislature, raised a regiment for the Canadian campaign in 1775, was in command at Ticonderoga, led a division at Brandywine, and commanded the

right wing at Germantown in 1777. At midnight on July 15, 1779, he led the attack on Stony Point which made him a popular idol and gained him his nickname. Later he rescued Lafayette, led an attack against the whole British army at Green Spring, and worsted the British and Indians in Georgia. When Charleston was surrendered Wayne occupied the town. He was made brevet major-general in 1783, retired a year later, and in 1791 represented Georgia in Congress. He was made commander-in-chief of the American army in 1792, and the next year fought the Indians in Ohio. He died in Erie, Pa., while concluding the Treaty of Greenville, which secured to the United States from the Indians a great tract of land in that vicinity.

ANTHONY WAYNE
A dashing leader of the American Revolutionary period.

**WEALTH.** It is believed that everything in the universe has use or utility. The use to which the things are put is not always good (for instance, burglars' tools and intoxicants), but the mere fact that somebody thinks an article is of use to him gives it value. Wealth, then, includes all material goods that have value. It should be noticed that from the standpoint of most economists only material goods are considered as wealth. Love and sympathy have moral or ethical value, but these are not material goods, and do not come under the heading of wealth. On the other hand, good will in a business is an asset, and is wealth.

Three elements enter into any estimate of wealth: the article must be useful, the supply must be limited, and the thing must be transferable. There is a tendency among students of economics to include more and more of the helpful things of life under wealth. As an illustration, it may be cited that a few years ago no writer on the subject thought of regarding sunlight and fresh air as wealth, but in this day, when the erection of immense city buildings has proved that light and air may be taken by one man from another, many students include such items under wealth, because lack of them decreases desirability; they are elements of convenience and health.

Wealth should be considered in its four phases of production, exchange, distribution and consumption. Under the first of these the investigator examines the amount of labor and sacrifice necessary to put an article into the form desired and to place it where it is most desired. This latter effort or activity gives what is called *place value*. Under the heading of *exchange* the relative values of products are investigated, and here it will be found that values are not always based upon utility or labor but upon the buyer's personal tastes and inclinations. The third item, the *distribution* of wealth, is one of the most important and disturbing questions before the world of to-day. For many thousands of years distribution was always connected with exchange; that is, goods were not distributed unless the one needing them paid in exchange a price which gave the seller a profit. Now, however, writers in favor of Socialism hold that distribution of wealth should go on without exchange for profit, but simply according to the needs of all members of society. The last phase considered under wealth, its *consumption,* is exceedingly important, because the question arises as to what usefulness to the world results from the use of its products. See CONSUMPTION. W.F.R.

Consult Mill's *Principles of Political Economy;* Laughlin's *Political Economy.*

**Related Subjects.** In this connection the reader may consult the following articles in these volumes:

| | |
|---|---|
| Capital | Profit |
| Credit | Supply and Demand |
| Economics | Value |
| Money | Wages |

**WEASEL,** *we'z'l,* a slim, swift, bloodthirsty animal, the winter coat of certain species of which produces valuable fur called *ermine.* The creature has a disagreeable odor, most noticeable in hot weather and when it is frightened or irritated. Weasels, with their keen sense of sight and scent, are excellent hunters; they pursue rats, mice, rabbits and birds untiringly, often apparently killing them only for sport, since the dead bodies are frequently left untouched. Although it sometimes kills farm poultry, it also destroys troublesome vermin, and thus is useful to man. The mother animal makes a cosy straw nest for her babies in hollow trees or in holes in the ground.

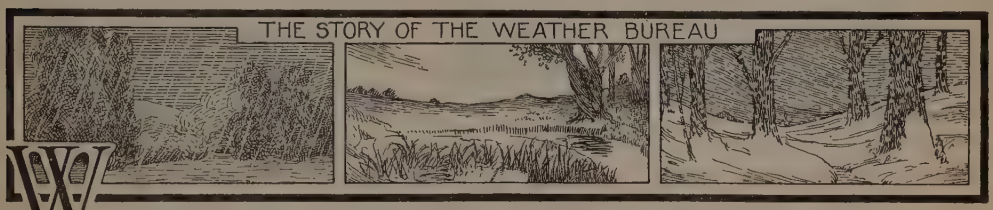
In North America, the *long-tailed* weasel is the best-known species. It is white below and dark-brown above, with a black-tipped tail, the

latter remaining black when the rest of its coat turns white to match the snow. The female is about thirteen inches long; the male, about sixteen inches. *Short-tailed* weasels, inches. The animal's brown parts are lighter and the white parts are yellower than in the long-tailed species. West of the Alleghanies is the *Arctic least* weasel, and in Texas and

THE WEASEL

widely distributed over the Northern United States and Canada, which produce most of the American ermine, are smaller than the others, the male being about eleven inches in length; the female is nine, the tail averaging two Florida there are larger varieties, but the latter do not turn white in winter. Some species are called *polecats,* or stoats. See POLECAT.

Consult Merriam's "Synopsis of the Weasels of North America" in *North American Fauna.*




**WEATHER BUREAU.** When the sun sets red or yellow in a cloudless sky we expect a fine day on the morrow, but a gray, lowering sunset, we say, is a sign of rain. A rainbow in the evening sky recalls to our minds the old rhyme:

Rainbow at night, sailors delight;
Rainbow in the morning, sailors take warning.

Sometimes, on a moonlit night, we look into the sky and see a series of circles about the moon. Then we say, "We are going to have a rain storm," and are quite as confident of the outcome of our prediction as Longfellow's "old Sailor" in the *Wreck of the Hesperus,* who had sailed the Spanish Main and knew whereof he spoke when he gave the warning:

"I pray thee put into yonder port,
For I fear a hurricane.

"Last night the moon had a golden ring,
And to-night no moon we see!"

These and many other bits of "weather wisdom," which have been learned by observation and experience or handed down by tradition, are suggestive of what government weather bureaus are doing on a large scale and according to scientific methods. There is hardly a civilized nation on the globe that does not operate a bureau for the purpose of giving weather information, and those of the United States, Canada, Germany, Great Britain and France are maintained according to highest standards of efficiency.

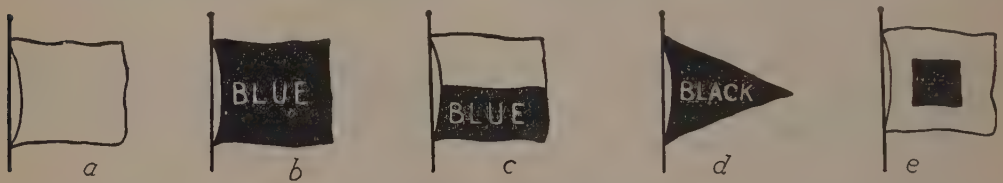
## *United States Weather Bureau*

The Weather Bureau of the United States has been a branch of the Department of Agriculture since 1891, but when organized in 1870 it was a division of the signal service in the War Department. Including a large number of coöperative observers who serve without remuneration (except the receipt of government publications), the Bureau has the service of about 10,000 persons. There are several divisions in the Bureau, each taking care of a special line of activity. Foremost in interest to the average citizen is the forecasting service.

**Forecast Division.** The daily weather reports that appear with unfailing regularity in the morning and evening papers have become such a matter of course that most people give

little thought as to the means by which they are obtained. Back of these reports is an elaborate system of observation that may be compared to a single observer's obtaining a bird's-eye view of the country as a whole. Suppose such an observer were to ascend in an airship every twelve hours, to a point where he could see all the weather conditions from the Canadian border to the Rio Grande, and from the Atlantic to the Pacific. The reports he would give of his surveys and the predictions he would make would be accepted by every one. The government Weather Bureau attempts something of the same kind by working through a number of observers, all acting in unison.

Scattered throughout the country are more than 200 telegraphic observing stations, and




WEATHER FLAGS

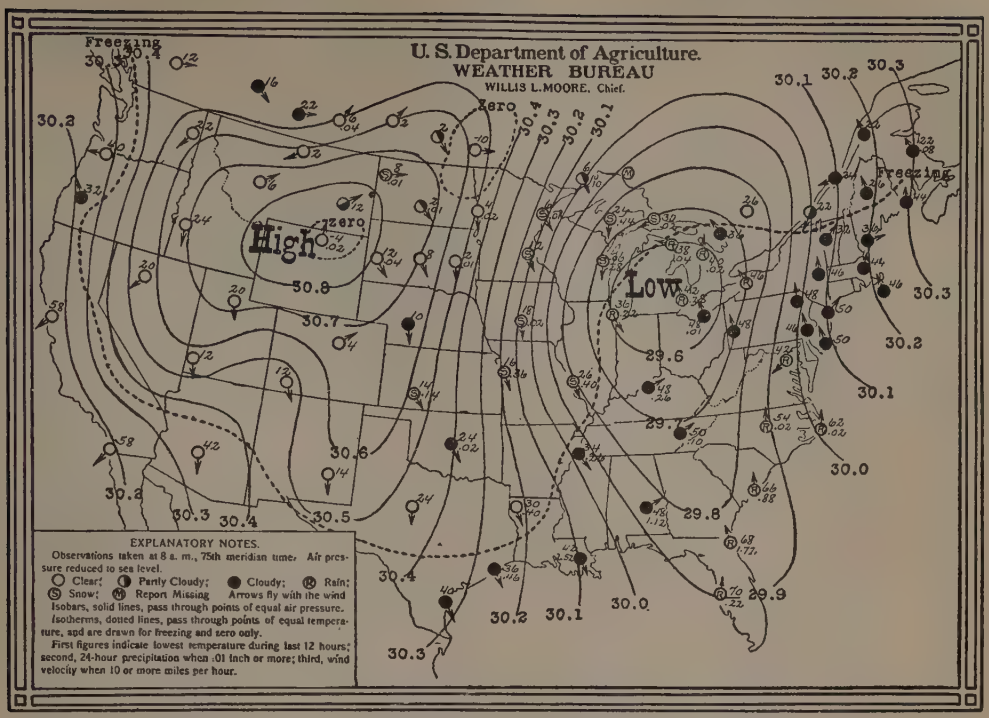
(*a*) White flag, indicates clear or fair weather; (*b*) blue flag, forecasts general rain or snow; (*c*) white and blue flag, local rain or snow; (*d*) black triangular flag, temperature indication; (*e*) white flag with black square in center, heralds the approach of a cold wave. When *d* is placed above *a*, *b* or *c* it is a prophecy of warmer weather (temperature higher); when below any of the three, colder weather is announced; when the temperature flag is not displayed no great change is expected. During late spring and early fall the cold wave flag announces threatened visits of frost; in the winter, of suddenly lowering temperature.

every twelve hours, exactly at 7:45 A. M. and 7:45 P. M. (seventy-fifth meridian time, near Washington, D. C.), the observation and the recording of weather conditions in the territory of each station take place. The results of his survey are then summarized by each observer, condensed into a cipher message of four or five words and transmitted to the proper telegraphic circuit. When translated, these brief code messages contain from thirty to fifty words. Though all are finally collected at the central office in Washington, D. C., they are translated at various forecasting stations along the route.

Though the work of observing conditions and of summarizing data is always completed at each station by eight o'clock, the notations and calculations are comprehensive. They include observation of sky and classification of clouds; reading of the barometer to ascertain atmospheric pressure, and making corrections to obtain corresponding readings for the sea level; observation of direction and velocity of wind; measurement of rainfall or snowfall; calculation of the amount of moisture in the atmosphere, and noting of such phenomena as thunderstorms, smoke, halos and fog. In addition, the temperature is read from the thermometer and the extremes since the last observation are noted.

*Weather maps* showing conditions over the country are constructed twice a day at the Washington office. A definite system of figures, letters and symbols to indicate various conditions has been adopted, as shown in the weather map, following. Small circles indicate the various observing stations. If the entire area of the circle is black it means prevailing cloudiness; partly cloudy conditions are shown by a half-blackened circle, and a clear circle indicates clear skies. An "R" in the circle means rain falling at the time of observation, and similarly "S" indicates a fall of snow. Arrows indicate the direction in which the wind is blowing. The small figures at the side of stations show barometer readings, temperature, velocity of wind in miles per hour, depth of rainfall or snowfall.

The prominent solid lines on the map are *isobars,* or lines of equal barometer readings. They pass through points of equal air pressure, and are drawn for each tenth of an inch of variation. To illustrate, the line marked "30.0" at each end (see Gulf of Mexico and Atlantic areas) passes through those points where the barometer readings are exactly thirty inches. The readings on one side of this line are higher than thirty inches, lines being drawn for each tenth of an inch *increase* until a crest or center is reached; such a center is marked "High." A center of depression on the other side of line "30.0" is located and marked "Low," lines being drawn for each tenth of an inch *decrease.* The value of isobars rests chiefly in the fact that they outline great atmospheric whirls, or eddies, and thus indicate centers of action. In




A DAILY MAP PUBLISHED BY THE WEATHER BUREAU

a low-pressure area cloudiness is the prevailing condition, while a high-pressure area is characterized by clear skies. To the forecaster the barometer reading is of as much importance as all of the other information combined, for the pressure of the air is the primary element in the study of all atmospheric movements. The chart also contains dotted lines called *isotherms*. These pass through points of equal temperature and are drawn only for freezing and zero.

By means of these weather maps a forecaster can predict conditions not only for his own locality, but also for those of states and cities at a distance. The forecasting centers are Washington, Chicago, New Orleans, Denver, San Francisco and Portland, Ore. From these centers over 2,050 Weather Bureau stations and forecast distributing centers receive daily reports, which are in turn sent by telephone and telegraph to more than 5,465,000 patrons, while 120,050 places are reached through regular mail routes and rural free delivery. Predictions are made of weather conditions for thirty-six to forty-eight hours in advance.

In addition to the weather charts covering the United States, the central office prepares each morning a chart of pressure and weather conditions over the entire northern hemisphere, based on reports received from meteorological bureaus in Europe and Asia, and from Weather Bureau stations in the United States, Alaska, Hawaii and the West Indies. Wireless messages containing weather information come from the Aleutian Islands of Alaska, and cabled reports are received daily from Nemuro, in Japan, and from Shanghai, in China. By means of these various channels of information the central office is qualified to predict general weather and temperature conditions over the entire United States for a week in advance. In the summer of 1916 the violence and duration of the hot period that caused so much suffering throughout the Middle West were forecast with remarkable accuracy.

The Bureau also sends out special warnings in regard to weather conditions by means of a system of flags and signals, such as are illustrated in this article.

**River and Flood Division.** This branch of the service has been the means of saving many lives and millions of dollars' worth of property through its warnings of floods, especially in the Ohio and the Mississippi valleys. It also maintains stations for the measurement of snowfall in the mountain regions of the West, with

the object of determining the amount of water that will probably be available for agricultural and commercial purposes in the following spring and summer. In connection with the Forest Service, stations are maintained in national forest areas to study the effect of forests on stream flow and climate.

**Division of Climate and Crops.** The special work of this division is the preparation of reports as to temperature, rainfall and other conditions that affect crops. In the corn and wheat regions more than a thousand bulletins are issued a day, and in the cotton belt over 1,500 are sent out. Throughout the country there are more than 4,000 coöperative meteorological stations which furnish data by which the main climatic features of the respective districts are established. Weekly and monthly reports or bulletins and special bulletins in regard to snow, ice, winds, etc., are valuable features of this very important branch of the service.

**Other Divisions.** The examination and testing of instruments; the auditing of accounts of the Bureau for telephone and telegraph service, and the performing of the regular routine telegraph work; the preparation and distribution of the publications of the service, and the purchase and inspection of supplies are all taken care of by special divisions.

## *In Canada*

The Canadian weather bureau is known officially as the METEOROLOGICAL SERVICE, and is a division of the Department of Marine and Fisheries. The observation of weather conditions, summarizing of data, preparation of weather charts and bulletins and other activities connected with the division are carried on in about the same way as has been described above. At the head of the Service is the superintendent, with headquarters at Toronto, Ont. He also is director of the Toronto Magnetic Observatory. Other observatories are located at Saint John, N. B.; Quebec, Que.; and Victoria, B. C. Though the Meteorological Service is a division of the Marine and Fisheries Department it serves the farmer as effectively as it does the shipper. B.M.W.

Consult Abbe's *Aims and Methods of State Weather Services* and publications of the United States Weather Bureau and of the Canadian Meteorological Service.

**Related Subjects.** In connection with this article the reader may refer to the following topics in these volumes:

| | |
|---|---|
| Climate | Meteorology |
| Cyclone | Norther |
| Frost | Rain |
| Hail | Rainbow |
| Humidity | Snow |
| Hurricane | Storms |
| Isobars | Tornado |
| Isothermal Lines | Wind |


---

**WEAVER,** *we'v'r,* JAMES BAIRD (1833-1912), an American political leader and brigadier-general in the War of Secession, was born in Dayton, Ohio. He studied law and was admitted to the bar in 1854. At the outbreak of the War of Secession he joined the Iowa volunteers, attaining the rank of brigade commander of volunteers in 1865. He entered political life after the war, and in 1866 was elected district attorney of the second judicial district of Iowa. For several years he was editor of the *Iowa Tribune,* published in Des Moines. In 1878 Weaver was elected to Congress by the Greenback party, and in 1880 was a candidate for the Presidency of the United States on the Greenback ticket. He was again nominated for the same office by the People's party in 1892, and received twenty-one electoral votes. From 1904 to 1906 he was mayor of Colfax, Iowa, having removed to that city in 1895. He published *A Call to Action.*

**WEAVER BIRD,** a finchlike, seed-eating bird of Africa and of Oriental and Australian regions, usually found in flocks so large as to be a menace to growing rice and other grains. It has small powers of song, but keeps up a continual chirping and chattering. All species are remarkable for the construction of their nests. The *sociable* weaver birds of the interior of South Africa build a community roof of grasses, often as large as a native hut, the underside of which is divided into compartments, each occupied by a pair of birds. The eggs are of a drab color, speckled with purple-gray, and are three or four in number. The *olive and yellow* weaver bird, also of South Africa, weaves a globe-shaped nest of the leaves of reeds, torn into strips, which it suspends from the branches of trees or from rushes, with the opening downward, a bar across the entrance keeping the two or three green eggs from rolling out. The *Java sparrow* uses

grasses for weaving its nest and makes the openings on the side. The eggs are pure white in color and are six or more in number. In

THE WEAVER BIRD
And some of the nests it constructs.

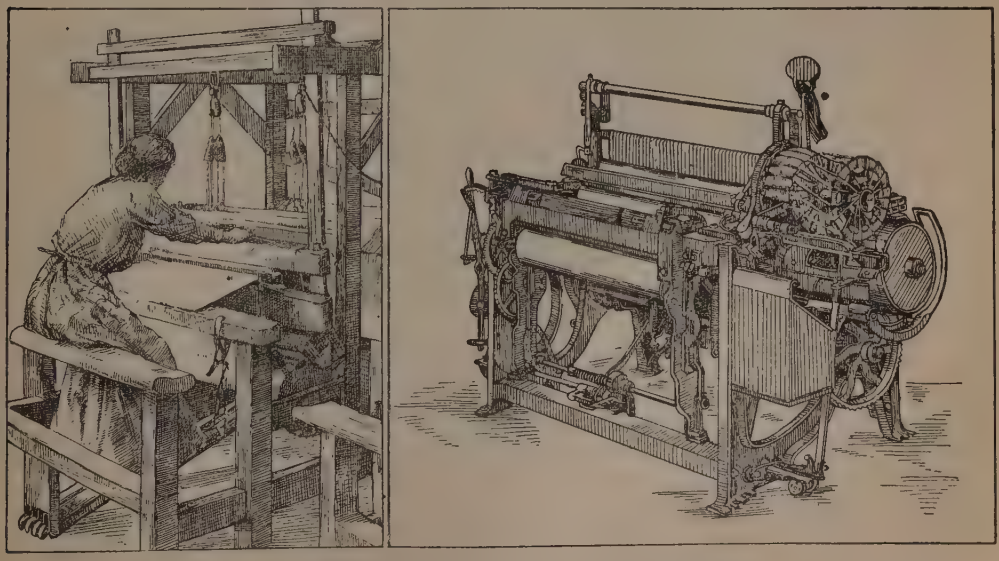
India and Ceylon is found the *baya,* a weaver bird which constructs a flask-shaped nest with a long, tubular entrance, suspending it from thorny branches of the tips of palm leaves.

**WEAVING,** *weev'ing,* the art of making cloth by interlacing threads or filaments of yarn. Between rustic homespun and the splendid tapestries of the sixteenth and seventeenth centuries, carefully preserved under glass in museums, there would seem to be a wide gulf; yet they are the result of substantially the same process of weaving.

To make cloth of whatever sort, the weaver passes one set of threads, known as the *weft* or *woof,* alternately under and over another set of threads, known as the *warp.* To do this he has to raise certain threads of the warp and lower others, in order to make room for the passage of his shuttle carrying the weft to and fro across the web. The remaining operation is simply the driving of the weft threads firmly against the warp, so as to form a web of cloth of the required texture. In working into his cloth designs of one sort or another, the weaver naturally changes somewhat the order in which the threads are interlaced; the principle, however, remains the same.

**Hand Weaving.** For centuries all weaving was done on hand looms, and much of it was surpassingly beautiful and rich. One need only mention the splendid Gobelin tapestries of seventeenth-century France and the rich velvets and silks produced throughout much of Europe after the Renaissance. Into the tapestries were wrought with cunning art, figures of man and beast, rustic fêtes, triumphs at arms and devotional subjects without end.

In weaving, the warp threads are first laid in place on the frame. They extend lengthwise of



YESTERDAY AND TO-DAY IN WEAVING
An old-fashioned wooden hand loom, and a modern loom.

the cloth, and are stretched parallel and close together. They might be likened to the strings of a harp, except that the space between them is quite small. Attached to the frame is an apparatus by which the heddles are lifted and lowered in response to the pressure of the weaver's foot on a pedal. The heddles consist of two frames from which hang cords attached by a loop to each thread in the warp. As alternate threads are attached to each heddle, it follows that when one heddle is raised, every second thread in the warp is lifted also.

When the warp threads are thus separated, the weaver deftly inserts his shuttle between them and drives the woof across the web. The shuttle is a hollow instrument containing a bobbin on which the weft thread is wound. When the thread has thus been introduced, it is necessary to bring it firmly against the warp, so as to give the cloth the required closeness of texture. This is accomplished by means of the batten, which is suspended from the top of the loom and works to and fro like a pendulum.

**Jacquard Loom.** Joseph Jacquard, a Lyons weaver, introduced an important improvement in 1801 by which complicated designs could be woven as easily as simple ones. He contrived an arrangement of hooks, often exceedingly numerous, by which threads could be lifted in any order and the figures wrought neatly into the web. His was the most important single improvement made on the hand loom.

**Power Loom.** The power loom, invented by Cartwright in 1784, has since undergone many modifications. It is operated now by steam or by electricity, but the principle is that of the hand loom. The power loom, which is now universal, has added vastly to the world's supply of goods. G.B.D.

Consult Oelsner's *A Handbook of Weaves*, translation by Dale; Nisbet's *Grammar of Technical Design*.

**WEBB CITY,** Mo., a city in Jasper County, situated in the southwestern part of the state, five miles northeast of Joplin. It is one of the most important zinc and lead mining centers in Missouri. In addition to numerous mining plants Webb City has machine shops, a foundry, ironworks, a cement-block factory and a brick and tile plant. Features of interest are Lakeside Park, a Federal building, a high school and the Jane Chinn Hospital. Transportation is provided by the Frisco and the Missouri Pacific railroads, and by interurban lines. In 1910 the population was 11,817; in 1916, 13,821 (Federal estimate).

**WEBER,** *va'ber,* Karl Maria Friedrich Ernest von (1786-1826), a German musical composer, born at Eutin, in Holstein. For many generations his family had been musicians, and his father hoped that in this son all the genius of his ancestors had concentrated itself. But Karl Weber had inherited too much of his father's instability of character to become a supremely great musician, and, moreover, during the first twelve years of the child's life the family wandered about so much that he received no steady training, either in books or in music. At the age of twelve, however, he received some thorough musical training from a brother of Joseph Haydn, and that same year published six little compositions. Then he went to Munich, where he received more serious instruction, and there, at thirteen years of age, he wrote his first opera, *The Power of Love and Wine*. Within the next year he composed at Freiberg, Germany, *Das Waldmädchen* (The Wood Nymph), and fame was achieved. It was a wonderful piece of work for a fourteen-year-old boy to produce, and not only in Germany, but elsewhere he was hailed as a true genius.

In 1801, while at Salzburg, the home of Haydn, he wrote a comic opera entitled *Peter Schmoll,* but this was a failure. Weber's real need was hard study in the theory of music, and this he obtained in 1803 as a pupil of the famous Viennese organist, whom Robert Browning describes so enthusiastically in his *Abt Vogler*. In 1804 Weber discontinued his lessons with Vogler to become musical director at a theater in Breslau, Germany. The eighteen-year-old boy became egotistical in this high position and soon lost it by his harsh treatment of members of the orchestra, whose knowledge of music was superior to his. At length he went to Darmstadt, and in 1810 composed the opera *Abu Hassan;* but Germany was at war with France, and men had little time to listen to operas. Weber, too, was fired with patriotism and set to music many of the battle songs of Körner and wrote the spirited cantata, *Strife and Victory*.

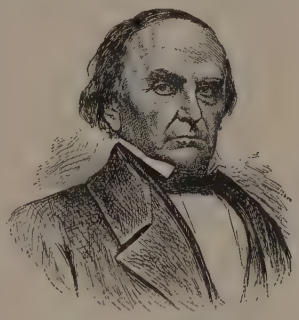
Meanwhile, he had been appointed director of the German Opera at Prague, but in 1816 resigned to go to Dresden to establish German opera in that city. He began his duties in 1818 and for the first time in his life went at the work with determination. There the following year he wrote his most famous opera, *Der Freischütz* (The Free Shooter), and for weeks German musicians talked of little else. Two

operas which followed, *Preciosa* and *Euryanthe,* failed to please, but in 1824 he composed *Oberon* for the Covent Garden theater, London, and went there to supervise rehearsals. Its success was instantaneous.

By this time tuberculosis had seized upon Weber, and each day it became more difficult for him to conduct the concerts and rehearsals. He lingered in London to conduct *Der Freischütz,* but on June 2, 1826, wrote his family a farewell letter, and on June 5 he died. The beautiful *Requiem,* the last composition of Mozart, was played at his funeral, and twelve musicians bore him to a grave in Moorfields, London, while the funeral march from the *Saul* of Handel was played. Later the body was removed to Dresden, where a monument to his memory now stands. R.D.M.

Consult Benedict's *Weber;* Gehrmann's *Weber.*

**WEB'STER,** DANIEL (1782-1852), the most eloquent patriotic orator and one of the greatest statesmen America has ever produced. He stands out in American history as one who, in a time of discord and uncertainty, upheld the integrity of the Union and the supremacy of the Constitution. Though he died nearly a decade before the outbreak of the war that was fought to preserve the Union, it is only just to say that his example of unswerving loyalty to the principles upon which the nation was founded proved a source of strength to the Northern people in the great struggle, and helped them win their cause. The attitude of Webster in the controversy between the North and the South is summed up in the closing words of his *Reply to Hayne,* one of the finest examples of American oratory:



DANIEL WEBSTER
He was probably America's greatest Constitutional lawyer.

When my eyes shall be turned to behold for the last time the sun in heaven, may I not see him shining on the broken and dishonored fragments of a once glorious Union; on states dissevered, discordant, belligerent; on a land rent with civil feuds, or drenched, it may be, in fraternal blood! Let their last feeble and lingering glance rather behold the gorgeous ensign of the republic, now known and honored throughout the earth, still full high advanced, its arms and trophies streaming in their original luster, not a stripe erased or polluted, not a single star obscured, bearing for its motto no such miserable interrogatory as "What is all this worth?" nor those other words of delusion and folly, "Liberty first and Union afterwards;" but everywhere, spread all over in characters of living light, blazing on all its ample folds, as they float over the sea and over the land, and in every wind under the whole heavens, that other sentiment, dear to every true American heart—Liberty *and* Union, now and forever, one and inseparable!

Daniel Webster was born in Salisbury (now Franklin), N. H., on January 18, 1782. He came of good blood, for his father, Ebenezer Webster, was one of the pioneers of New Hampshire, and fought in the French and Indian and Revolutionary wars. Later he sat as a delegate in the state convention which ratified the Federal Constitution. Daniel received the best education that was possible in those days for one in his circumstances, and was graduated at Dartmouth College when he was nineteen years of age. After leaving college he began at once to fit himself for the profession of law, and in 1805 was admitted to the bar in Boston. Two years later he settled in Portsmouth, N. H., where he speedily became a prominent figure in law and politics.

Webster entered the national House of Representatives in May, 1813, as a Federalist, at a time when Henry Clay was Speaker. The latter made him a member of the Committee on Foreign Relations. It is interesting to note that John C. Calhoun was chairman of this important committee. For over forty years these three—Webster, Clay and Calhoun—occupied a foremost place in the political history of the republic. From the first Webster took an active part in the nation's affairs. He criticized the policy of the administration in regard to the War of 1812, urged the repeal of the embargo and nonimportation acts, and voted against the rechartering of the United States Bank. When he left Congress, in March, 1817, he was widely known as one of the best public speakers of his day.

Webster had removed to Boston in 1816, and for the next six or seven years he made a great record in Massachusetts as a lawyer, especially as an advocate on constitutional questions. He was one of the counsel for Dartmouth College in a celebrated suit against the New Hampshire legislature, and won the case for the college by a powerful plea before the United States Supreme Court. By this victory he vindicated the supremacy of the Constitution. This principle of nationalism he successfully upheld in two other notable cases before the tribunal—

the case of McCulloch vs. Maryland, in which he argued that a state could not tax a branch bank of the national government, and the case of Gibbons vs. Ogden, in which the right of Congress to control interstate commerce was definitely established.

On the two-hundredth anniversary of the landing of the Pilgrim Fathers, Webster delivered at Plymouth one of the great speeches upon which his fame as an orator rests. In 1825 he stirred his listeners with another eloquent oration, at the laying of the corner stone of Bunker Hill Monument, and the following year he delivered his splendid eulogy on John Adams and Thomas Jefferson, both of whom died on July 4, 1826. Meanwhile, in 1822, the Boston district in which he lived had elected him to Congress. He served in the House until 1827, and in that year began his long and illustrious career in the Senate. In 1828 bitter opposition was aroused in the South by the so-called "tariff of abominations," and out of the controversy rose the issue of nullification. It was the defense of this dangerous doctrine, on the part of Senator Robert Y. Hayne of South Carolina (1830), that inspired Webster's masterly reply with its ringing "Liberty and Union, now and forever, one and inseparable." Congress then entered upon the discussion concerning the renewal of the United States Bank charter. President Jackson's arbitrary policy in this and other matters drew together a large number of malcontents, and they organized the Whig party, with Webster as one of the leaders.

In 1840 the Whig candidate, William Henry Harrison, was elected to the Presidency on the strength of his personal popularity. Webster, who was far better qualified than Harrison for the higher post, accepted appointment as Secretary of State, and retained his office under Harrison's successor, John Tyler, until he had completed the negotiations of the Webster-Ashburton Treaty. In May, 1843, he resigned from the Cabinet, partly because the Whigs objected to having one of their number associated with Tyler, who was a Democrat.

Webster reëntered the Senate in 1845. He vigorously opposed the annexation of Texas and the war with Mexico, because he dreaded to see further extension of slave territory, but, even with all his love for the Union, he favored compromise rather than war with the South. His attitude on the Compromise of 1850 disappointed his Northern friends, especially the Abolitionists. In a great speech supporting the famous measure he advocated concessions to the South, thereby bringing upon himself the charge that he was playing for the favor of slaveholders and seeking their support in his aspirations for the Presidency. It was this attitude that moved Whittier to write his poem *Ichabod,* beginning—

> So fallen! so lost! the light withdrawn
> Which once he wore!
> The glory from his gray hairs gone
> Forevermore!

Webster's career was now drawing to a close. He became Secretary of State in Fillmore's Cabinet in 1850, and made his second term in this office forever memorable by his championship of Louis Kossuth, the Hungarian patriot who had unsuccessfully attempted to set up a republic in his native land. In his correspondence with the Austrian government Webster declared that the United States would sympathize with "responsible and popular government in any part of the world." This was his last important public act. On October 24, 1852, the great orator died at his home at Marshfield, Mass., and the nation, mindful only of his unselfish and unfaltering devotion to his country, united to honor his memory and to mourn his passing. B.M.W.

Consult McMaster's *Daniel Webster;* Fisher's *Webster.*

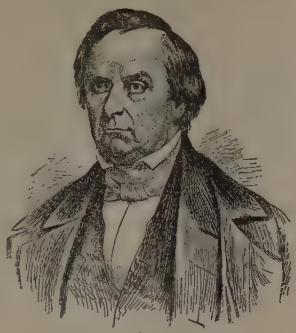
**Related Subjects.** The following articles in these volumes will explain certain references in the above discussion:

| | |
|---|---|
| Calhoun, John C. | Hayne, Robert Young |
| Clay, Henry | Kossuth, Louis |
| Compromise of 1850 | Nullification |
| Dartmouth College, subhead *Dartmouth College Case* | Webster-Ashburton Treaty |

**WEBSTER,** Noah (1758-1843), the author of *Webster's Dictionary* and of *Webster's Spelling Book.* He was born in Hartford, Conn., and was graduated from Yale, after serving as a volunteer in the Revolutionary War in the midst of his college course. He prepared to practice law, but taught school for some years, instead; and it was his experience as a teacher which led him to write his famous spelling book. Although less than one cent a copy was allowed him as royalty on this work, the income was sufficient for the support of his family, for the book sold by the millions.

During the critical period of United States history after the close of the war Webster wrote many articles and pamphlets on political topics, some of which had considerable influence in shaping public opinion. In 1807 he began the great work of his life—his *American*

*Dictionary of the English Language,* in the preparation of which he spent a year in Europe. It was an enormous task that Webster undertook, since the first edition included twelve thousand words and forty thousand definitions that had never appeared in any similar publication. The first edition was finished in 1828, and in 1840 a second edition was published. In its latest revised and enlarged form, *Webster's International Dictionary* is still a standard authority. Webster moved to Amherst, Mass., in 1812, and while living there helped to found Amherst College. Ten years later he moved to New Haven, Conn., where he died. See DICTIONARY.



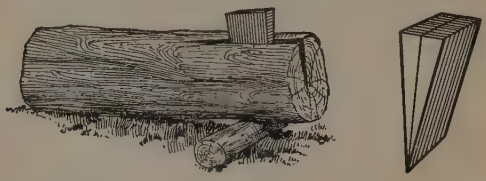
NOAH WEBSTER
He gave to America the original Webster's Dictionary.

**WEBSTER,** MASS., a town in the south-central part of the state, in Worcester County, sixteen miles southwest of Worcester, thirty-nine miles northwest of Providence, R. I., and fifty-nine miles southwest of Boston. It is on the French River, and is served by the New York, New Haven & Hartford and the Boston & Albany railroads and by interurban lines. The town, which includes several villages, covers an area of more than thirteen square miles. Webster has large mills, run by the power of the river, which manufacture textiles, shoes, tobacco products, machinery and tools. The city was named for Daniel Webster. It was incorporated in 1832. Population in 1910, 11,509; in 1916, 13,210 (Federal estimate).

**WEBSTER-ASHBURTON TREATY,** a treaty negotiated by Daniel Webster and Lord Alexander Baring Ashburton, representing the United States and England, respectively. It was signed in Washington in August, 1842, and fixed the boundary line between Canada and the state of Maine. The United States got seven-twelfths of the disputed land, but England got the better military frontier. Provisions for ending slave trading were included in the eighth and ninth articles, and the extradition of criminals was agreed on in the tenth. The treaty settled a long-standing and bitter dispute between England and the United States.

See map of the Maine boundary claims, page 3607.

**WEDGE,** *wedj,* a word derived from the old English, meaning a *mass of metal,* is applied to a combination of two inclined planes which form a block broad at one end and inclined to a thin edge at the other. It is used largely to



A WEDGE
At the left, one of the uses to which it is put.

split logs and rocks. When driven with a mallet into a cut or fissure the wedge exerts a great pressure in a small space. It is an instance where friction is an advantage, since the friction is great enough to hold the wedge in place in spite of the pressure.

In meteorology the term denotes a narrow, high-pressure belt between two cyclonic whirls.

**WEDGWOOD, WARE,** the name given the beautiful, high-grade ware produced by England's most famous potter, Josiah Wedgwood. At first he made experiments with the popular cream-colored earthenware of the pe-

SPECIMENS OF WEDGWOOD WARE
The dishes are light blue in color, with figures in white cameo.

riod, and these efforts resulted in the creation of a new kind of pottery which he called *Queen's,* in honor of Queen Charlotte, wife of George III. This was made in various shades of cream, saffron and straw, and was used for dinner and dessert services and for tea and coffee sets. The most important classes which followed were Egyptian black, or *basaltes,* used for medallion portraits, vases, busts, seals and similar objects; red ware, or *Russo antico,* used for cameo reliefs; *white semiporcelain,* or fine stoneware, distinguished for its smooth surface; variegated ware, showing a combination of many different colors; and *jasper,* representing

the culmination of the great potter's efforts. This last resembles the finest grade of white terra cotta in outward appearance, but its chemical composition is entirely different. Solid jasper has a blue tint, but in making the jasper body Wedgwood used besides white, various tints of blue, and lilac, pink, sage-green, olive-green, yellow and black. Among the objects made in this ware are medallions, cameos, statuettes, pedestals, flowerpots and vases. Figures in relief, representing classical art, adorned objects made from jasper, and eminent artists were employed to make the designs. One of the most famous of the Wedgwood creations is a copy of the celebrated Portland vase.

**Josiah Wedgwood** (1730-1795) was born at Burslem, Staffordshire. He came from a family of potters. Although handicapped by the loss of a limb, during his entire life he gave personal attention to the details of his pottery, and his influence on the development of the ceramic art has been permanent and far-reaching. Wedgwood was deeply interested in all matters pertaining to the public welfare; it was mainly through his influence that the Grand Trunk Canal, connecting the waters of the Mersey, the Trent and the Severn, was made possible.

Consult Meteyard's *The Wedgwood Handbook;* Church's *Josiah Wedgwood, Master Potter.*

**WEDNESDAY,** *wenz'da,* the fourth day of the week, the day sacred to Woden or Odin, the chief god of Norse mythology. The French call the day *mercredi,* from Mercury, the Roman god who is usually identified with Odin.

**WEED,** Thurlow (1797-1882), an American journalist and political leader, who took an active part in shaping the policy of the Republican party of his time. He was born in Cairo, N. Y. At the age of fifteen he left his position of apprentice in a printing office to become a volunteer in the War of 1812. In 1819 he established *The Agriculturist* at Norwich, N. Y., and in 1822 edited the Rochester *Telegraph.* He then established the Albany *Journal* and edited it until 1865. Through his political skill and the wide influence of his paper, he became the state political manager of the Whig, and afterward of the Republican, party. He went to Europe in 1861 on a diplomatic mission to induce foreign governments not to interfere in the War of Secession. In 1867 he became editor of the *Commercial Advertiser* of New York City, but ill health soon forced him to resign this position. He published *Letters from Europe and the West Indies* and an *Autobiography.*

**WEEDS,** plants which are troublesome to the farmer, and worthless where they grow. There is no dividing line between weeds and useful plants except that of relation. Oats growing in a cornfield, for example, would be regarded as weeds, but in the oatfield they are useful plants. Grass grows in almost every cultivated field and is a hindrance to the crop, so it is looked upon there as a weed, but it constitutes the wealth-producing crop of the hayfield and the pasture.

SEEDS OF SOME COMMON WEEDS

(1) Orange hawkweed; (2) long-leaf plantain, or ribgrass; (3) wild carrot; (4) Canada thistle; (5) wild mustard. Each is shown in the illustration in natural size and in enlarged form, to disclose more of their characteristics.

According to their growth weeds may be divided into three classes, as follows: *annuals,* those that live but one year; *biennials,* those that live two years, and *perennials,* those that live more than two years. Since annuals propagate themselves entirely by seeds, they should be destroyed before the seeds are ripe. Most annual weeds produce a large number of seeds, a single plant frequently bearing several thousand. To plow such plants under is to provide for an abundant crop of weeds the next season. The seeds of some of these plants will live underground for two or three years and then

germinate when favorable conditions arise, as when the farmer resorts to deep plowing to kill the seed; in this case the second plowing is followed by a crop of weeds.

The strength of biennials is in both the root and the seed. The bull thistle, or purple thistle, is a good example of biennials. The young plants begin to grow in the fall and the following season produce a stalk three or four feet high, bearing thousands of seeds. The young plants should be destroyed as soon as they appear. To accomplish this it is necessary to cut them off far enough beneath the surface to destroy the roots.

Perennials are the most troublesome weeds because they have spreading roots which are constantly producing new plants. These plants also produce many seeds. The Canada thistle, the bindweed, or morning-glory, the quack grass and the oxeye daisy are some of the most troublesome weeds of this class. If the stalks are kept from growing so that the roots can get no nourishment for two or three seasons, the roots die, and the weed is destroyed. This may be accomplished by turning the land into pasture. To cultivate land infested with these plants and leave the roots in the ground is to increase the crop of weeds, since each section of the root will produce a new plant.

Early and constant tillage, burning over infested ground before plowing, and mowing roadsides, vacant lots and all other untilled lands before seeds ripen are the best means of preventing weeds. The United States Department of Agriculture will send helpful bulletins on the subject to those requesting them.

**Herbicides,** substances used in destroying weeds. A standard herbicide that kills pennycress, wild radish, shepherd's-purse and similar weeds is a solution of copper sulphate, mixed in the proportion of one pound of copper sulphate to four gallons of water. Crude salt, applied at the rate of 300 pounds to the acre, will rid meadows of the stubborn orange hawkweed. Spraying lawns with iron sulphate, if the application is repeated several times, will clear lawns of dandelions. Other chemicals used successfully include diluted carbolic acid, arsenic, sal soda and kerosene. W.F.R.

**Related Subjects.** It is impossible to list all the weeds here, because, as stated in the article above, many plants are weeds in one position and not in another. But the following are among the commonest weeds of the United States and Canada:

Abutilon
Agrimony
Bindweed
Burdock
Canada Thistle
Cocklebur
Cow Parsnip
Dandelion
Dock
Feverfew
Fleabane
Goosefoot
Grómwell
Indian Mallow
Milkweed
Mullein
Pigweed
Plantain
Ragweed
Sand Bur
Sow Thistle
Stickseed
Stramonium
Thistle
Toadflax

See, also: Annuals; Biennials; Perennials; Seeds.

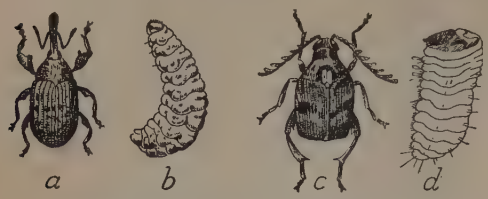
**WEEK,** an artificial period of time, including seven days. There is some evidence that the week is a division based on the four phases of the moon, but this theory is not now held in favor. The ancient Chinese, Egyptians, Persians and Babylonians are among the nations known to have used the week as a division of time. Among the ancient Hebrews the week was associated with the belief in the creation of the world in six days, the seventh day, or Sabbath, being a day of rest and worship. The days, however, had no ancient Hebraic names; they were simply counted; Monday, therefore, would be "two after the Sabbath."

The Egyptians recognized the seventh day merely as a day of recreation; they named each day from one of the planets. Among the later Romans the week was also connected with the sun, moon and five planets. Each day was sacred to a Roman deity, who was associated with a planet, and the days were known, therefore, as Sun's-day, Moon's-day, Mar's-day, etc. This system was already in use about the beginning of the Christian Era, but it was not officially recognized until the reign of Constantine, soon after A. D. 300. The Teutonic and English names are translations of the Roman. The Mohammedans also observe the religious character of the week, Friday being observed by them as the Sabbath day.

**WEEVIL,** *we'v'l,* the name of several kinds of small beetles, whose chief characteristic is a long snout which sometimes exceeds the length of the body. The name is also applied to the larvae (young), which are short, footless worms of white or yellow color. Weevils are among the worst pests that trouble the farmer. The beetles are so small that they are not easily seen, and the eggs are laid in the stalk, seed or fruit of the plant, upon which the grub feeds, causing great damage and loss to the crop. There are weevils which attack grain, weevils that attack fruit and those that attack such crops as clover, alfalfa and cotton. The *cotton boll* weevil, more commonly called the boll

weevil, causes the greatest loss in the United States (see BOLL WEEVIL).

The *grain* weevil is dark red and about one-eighth of an inch long. It is very destructive




FOUR OF THE WEEVILS

(*a*) Cotton boll weevil; (*b*) full-grown larva of *a*; (*c*) cowpea weevil; (*d*) larva of same enlarged.

to wheat, laying its eggs on the wheat after it is stored. The grubs burrow into the grain. The *rice* weevil destroys rice and corn in a similar manner. The *alfalfa* weevil first appeared near Salt Lake City about 1904 and has spread so rapidly that it yearly causes great loss in the alfalfa-growing regions. It is a small, tawny-colored beetle, less than one-fourth of an inch long. This beetle was imported into the country from Europe and Asia, where numerous insect enemies which live upon the weevil and its eggs keep it in check. The United States Department of Agriculture has imported these parasites in large numbers, hoping that they will check the ravages of the alfalfa weevil.

ALFALFA WEEVIL

There are numerous sorts of fruit weevils. Some attack plums and cherries, the worms feeding upon the fruit, which falls off or becomes wormy; others damage the strawberry crop by attacking the blossoms, and the *grape* weevil damages vineyards by attacking the vines.

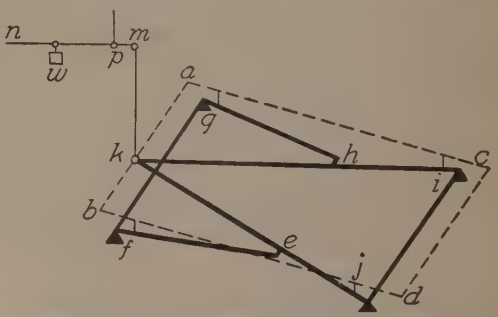
W.F.R.

Consult Comstock's *Manual for the Study of Insects;* Kellogg's *American Insects.*

**WEIGHING,** *wa'ing,* **SCALE,** a mechanical device for determining the weight of any substance. There are many forms of these machines, but they are all based on the principle that certain weights balance each other or that one will outweigh the other. Two pieces of iron weighing exactly one pound each, if suspended by two strings attached to each end of a balanced and pivoted rod will not disturb the balance of that rod. If, however, the weights are not equal, the heavier will pull its end of the rod down and raise the lighter weight. If the rod is not exactly balanced, but pivoted at a point nearer one end than the other, it would require a greater weight suspended from the shorter end to raise the pound suspended at the longer distance from the pivot. There lies the principle of the lever, on which most scales are operated.

The balance and the steelyard, the most familiar and simple forms of weighing scales, are described in these volumes. Another familiar form of weighing machine is the *platform scale,* which consists of a hinged platform, set within or above a fixed platform and pressing on a lever underneath when a weight is placed on it. The lever is connected with a rod which rises perpendicularly for a certain height (according to the size of the machine) and then is carried at right angles to a point at which it is pivoted, from which point it is continued in the form of the longer end of a lever, with the weights marked on it. The object on the platform whose weight it is desired to know presses down the lever under the platform, pulling down the shorter end of the weighing lever and causing the longer arm with the weights to rise. A weight is moved along the lever until an exact balance is found. The mark in pounds indicated on the lever is the weight of the object on the platform.

In platform scales for weighing small quantities the lever is made of such a length that the weight of one pound on the lever may be




PRINCIPLE OF THE WEIGHING SCALE

A load is placed in the platform *abcd.* This load is conveyed to the system of levers by the standards *f, g, i, j,* and depresses them so that they exert a pull downward on the rod *km* and the short arm of the lever *mp.* This pull is balanced by sliding the weight along the lever or scale beam *mn,* which is so graduated into pounds and fractions that the weight of the article on the platform is read at a glance.

equal to ten pounds or 100 pounds on the platform. For weighing loaded wagons and trucks this proportion may be increased until one pound on the lever equals 1,000 pounds or more on the platform.

There is almost an infinite variety of weighing machines; some are so large that they will correctly weigh monster locomotives, others, used by scientists, are so delicately adjusted that the weight of a human hair is sufficient to destroy the balance. Machines for weighing heavy guns in government arsenals have a capacity of over 300,000 pounds; spring scales can be made so strong that they will register in tons the pull of the most powerful locomotive.

A complicated balance scale is now used in stores for weighing groceries and such commodities. These not only weigh the goods but indicate the cost by means of automatic calculators. An indicator is set at the price per pound at which the goods are to be sold. The articles are then put on the scales; a lever indicates the weight in the ordinary manner, and the price is indicated by a hand on a clock-like dial. F.ST.A.

**WEIGHT,** *wayt,* a measure of the pull of gravitation on any body. To say that a pail of water weighs five pounds is to say that the earth attracts it to that extent. A body at the center of the earth would lack weight, because of equal attraction in all directions. The weight of a body above the surface of the globe diminishes as it recedes from the center. This fact has to be taken into account in weighing, because the earth bulges at the equator and is slightly flattened near the poles. Accordingly, a mass of iron which weighs 1,000 pounds at the equator will gain about five pounds at the poles. Thus, in extremely careful weighing it is important to specify the latitude and the elevation. In popular usage, weight is not thought of as the attraction of gravity, but only as the quantity of downward pull of an object compared with that of a given mass of metal taken as a standard. See GRAVITATION.

**WEIGHTS AND MEASURES.** These are the general terms used to describe the standards employed in measuring weights, quantities and volumes. Even among peoples in the lower stages of civilization, such standards are necessary, and with the growing complexity of life they become of greater and greater importance. Most of the units as originally chosen are arbitrary, and bear no share in a system; but as science comes to dominate a larger part in life and communication between nations increases, greater accuracy and uniformity in weights and measures are aimed at. To-day practically all of the Western nations have standardized their units, and for scientific purposes a uniform system, the metric, has been very widely adopted. These volumes contain many articles which bear on general phases of the subject of measurement or on specific units, and the reader may consult the topics listed below. (In the article DENOMINATE NUMBERS many tables of weights and measures are given.)

| | |
|---|---|
| Acre | Kilogrammeter |
| Ampere | Kilometer |
| Apothecaries' Weight | Kilowatt |
| Avoirdupois | Knot |
| Barrel | League |
| Bushel | Liter |
| Carat | Mensuration |
| Centimeter | Meter |
| Chain | Metric System |
| Cubic Measure | Mile |
| Denominate Numbers | Ohm |
| Drachma | Ounce |
| Farad | Pound |
| Fathom | Quart |
| Foot | Scruple |
| Furlong | Ton |
| Gallon | Troy Weight |
| Gram | Volt |
| Hogshead | Watt |
| Kilogram | Weighing Scale |

Consult Woolhouse's *Measures, Weights and Moneys of All Nations.*

**WELDING.** See ELECTRIC WELDING.

**WELLAND,** *wel'and,* a town in Ontario, the county town of Welland County. It lies on the Welland Canal, and is served principally by the Canadian Pacific, the Grand Trunk, the Michigan Central and the Wabash railroads. By rail it is seventeen miles southwest of Niagara Falls and seven miles north of Port Colborne, the southern end of the Welland Canal. There are two government docks and a turning basin. It lies at the heart of the Niagara peninsula, and has become an important railroad center as well as a distributing and manufacturing community. There is abundant natural gas in the vicinity, and water power is derived from Niagara Falls. Especially important among its products are agricultural implements and other iron and steel manufactures, cordage and cotton goods. Population in 1911, 5,318; in 1916, estimated, 5,800.

**WELLAND CANAL,** one of the most important artificial waterways in Canada. It forms a navigable link between Lake Erie and Lake Ontario, whose only natural connection, the Niagara River, is interrupted by the great falls and rapids. The original Welland Canal was finished in 1833, a year after the completion of the Rideau Canal, at a cost of about $7,700,000. In 1871 it was greatly enlarged, the expense of the improvements being $21,749,000,

or nearly three times the original cost. As completed in 1871 it was twenty-six and three-fourths miles long, had an average width of 160 feet and depth of 15 feet, and included twenty-five locks, each 270 feet by 45 feet. It

WELLAND CANAL, OLD AND NEW
(1) New canal; (2) old canal; (3, 3) feeders.

extended from Port Colborne on Lake Erie to Port Dalhousie on Lake Ontario. The average annual tonnage of freight on the canal is about 4,000,000.

**New Ship Canal.** In 1912 the Dominion government decided to make additional improvements which would eventually cost $50,000,000. Active construction was begun in 1913, and was continued in the following years in spite of the tremendous burden placed on the Dominion by the War of the Nations. The new ship canal will accommodate larger vessels than can use the present canal. The width of the canal will be 200 feet at the bottom and 310 feet at the water line. The twenty-five old locks will be replaced by seven large ones, each 800 feet long by 80 feet wide in the clear, and 30 feet deep at low water; each lock will have a lift of forty-six and one-half feet, making a total lift of 325½ feet, which is the average difference in level between lakes Erie and Ontario.

These locks rival those of the Panama Canal; they are not as long as those at Gatun, but the lift is greater. Three of the locks have a combined lift of 139½ feet; whereas the similar flight of three locks at Gatun has a lift of only 85 feet. The locks will be double, one side for up-bound and the other for down-bound vessels, and will have swinging, single-leaf gates.

During the early years of the War of the Nations, particularly in 1915, there were numerous efforts by German spies to destroy the canal, but without success. W.F.Z.

**WELL BORING,** the drilling of holes of small diameter and of varying depth, to tap reservoirs of water, oil or gas, or to locate deposits of iron and other minerals. Most deep wells are bored with a heavy, chisel-shaped bar having a cutting edge of steel, which descends vertically, crushing the rock by a succession of heavy blows. For penetrating denser rock another sort of tool, the diamond drill, is used. The pounding drill is, however, much more extensively employed; it has been developed to a point of the highest efficiency in gas and oil regions.

The typical pounding drill consists of an upright frame, or derrick, about twenty feet across at the base and seventy feet high. It is placed over the spot where the well is to be bored. Two pulleys, suspended in the tower, support the crushing bar and a bucket for removing the powdered rock and débris. The crushing bar, or drill, is lifted and lowered by means of a cable passed over the pulley and operated by steam power. As successive blows are delivered, the drill is turned slightly, so that an almost circular hole results. When sufficient débris has been accumulated to impede the working of the drill, the steel buckets are lowered, filled with mud and hoisted to the surface. This bucket is fitted with a bottom opening inward and working like a valve; it is forced up as the bucket descends, and is closed as it is lifted. In order to facilitate the removal of débris, water is turned into the cutting at intervals to reduce the rock dust to mud. It is customary to line the upper portions of deep wells with a wrought-iron or steel casing, to prevent the caving of soft rock and to exclude surface water. With such drills, holes 3,000 or 4,000 feet deep can be driven, but the expense increases with work on the lower levels. See ARTESIAN WELL; PETROLEUM.

**WELLES,** *welz,* GIDEON (1802-1878), an American statesman and former Secretary of the Navy, was born at Glastonbury, Conn. He studied at Norwich University, which he left without taking a degree, and from 1826 to 1836 was editor of the Hartford *Times.* From 1827 to 1835 he was a member of the Connecticut legislature, in which he advocated the abolition of imprisonment for debt. He became state comptroller in 1835, and from 1846 to 1849 was chief of the bureau of supplies in the United States navy. Although originally a Democrat, he joined the Republican party upon its organization, and at the beginning of the War of Secession was appointed Secretary of the Navy by President Lincoln. Under his management a blockade was established along the Confederate coast, and a fleet of transports and iron-

clads was formed on the Mississippi River. He supported the reconstruction policy of Johnson, but in 1876 used his influence in favor of the Democratic candidate, Samuel J. Tilden.

**WELLESLEY,** *welz'li,* Mass., a town in Norfolk County, situated in a beautiful wooded and hilly region fifteen miles west of Boston. It is of chief interest as the seat of Wellesley College (which see). Other educational institutions here include the Academy of the Assumption and Dana Hall, a school for girls. Wellesley, which is made up of several villages, has many beautiful homes. It is served by the Boston & Albany Railroad. Population in 1910, 5,413; in 1915, 6,439 (state census).

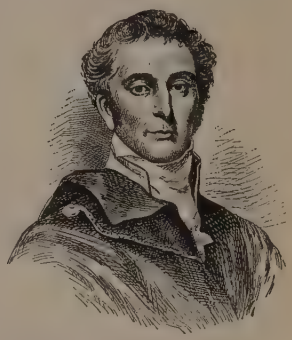
**WELLESLEY COLLEGE,** at Wellesley, Mass., one of the leading American colleges for women. It was founded in 1875 by Henry Fowle Durant as a distinctly Christian but nonsectarian school. The campus, a park of 300 acres, borders upon a beautiful lake. Wellesley contributes to the support of the American schools of classical study at Rome and Athens, to the Marine Biological Laboratory at Wood's Hole, Mass., and to the Zoölogical Station at Naples. The college library, which contains over 86,000 volumes, includes the private collection of Mr. Durant, the Library of American Linguistics, a gift of E. N. Horsford, and a library of Italian literature, established by G. A. Plimpton. All undergraduate work leads to the degree of B. A., and those who complete graduate work receive the M. A. degree. The main building of the college was burned in 1914, and was rebuilt by funds raised by students and alumnae.

**Henry Fowle Durant** (1822-1881), the founder of Wellesley College, was born at Hanover, N. H. He was graduated at Harvard in 1841, and after studying law engaged in practice in Boston, where he built up a large legal business. Later he was converted to evangelical Christianity; from 1864 to 1875 he preached as a layman in Massachusetts and New Hampshire. His contributions to Wellesley amounted to over a million dollars.

Consult Converse's *The Story of Wellesley.*

**WELLINGTON,** *wel'ing ton,* the capital and one of the busiest seaports of New Zealand, is situated on the southern coast of North Island, on an inlet of Port Nicholson. It is 1,280 miles from Sydney, the nearest Australian port, and 4,400 miles from Cape Horn, at the southern tip of South America (see map, following page 4336). The harbor is beautiful and commodious, and is well equipped with facilities for handling the great volume of shipping that contributes to the prosperity of the city. Wellington has modern streets and public buildings, two cathedrals, a public library, fine botanical gardens and a beautiful public park. Its chief educational institution is Victoria College, which is affiliated with the University of New Zealand. Manufacturing is carried on extensively; the articles made include plows, lumber, meat products, soap, candles, brick, and malt liquors. Wellington was founded in 1840 by the New Zealand Company, and was the first settlement of that organization. Population in 1911, 64,372; including suburbs, 70,729. See NEW ZEALAND.

**WELLINGTON,** ARTHUR WELLESLEY, Duke of, a British general and statesman, famous for his splendid military career which culminated in the final overthrow of Napoleon in the Battle of Waterloo. By his tenacity of purpose, coolness and firmness, he won the title of the "Iron Duke," and even during his lifetime was venerated as one of England's greatest heroes.



DUKE OF WELLINGTON

He was the fourth son of Garret Wellesley, Earl of Mornington; was born at Dublin in 1769 and educated at Eton and at the Military College of Angers, France. In 1787 he entered the army as an ensign and after rising rapidly through the lower commissions attained the rank of colonel in 1796. His first active military service was in the campaign in Flanders in 1794 and 1795, where he distinguished himself for bravery. In 1797 his regiment was sent to Bengal, where it played an important part in the victory at Malavelly and in the capture of Seringapatam. Wellesley was given the rank of major-general and was placed in command of the British forces in the Mahratta War. He not only defeated the natives in battle, but by his shrewd judgment, fair treatment and personal ascendancy among the chiefs was able to establish firmly British authority in the East.

Shortly after his return to England in 1805 he was elected to Parliament, and in 1807 was appointed Secretary of State for Ireland. In 1808 he was promoted to the rank of lieutenant-

general and was given command of the forces operating against the French in Portugal and Spain. There he defeated the French army under Junot in the Battle of Vimeiro, and the campaign closed with the convention at Cintra, by which the French agreed to evacuate Portugal.

In 1809 he was given chief command of the British forces in the Peninsular War. Receiving little aid from the inefficient troops and the governments of Spain and Portugal, with his small army he gradually drove the French forces under Masséna, Soult and Marmont from the peninsula, winning notable victories in the battles of Talavera, Salamanca, Busaco, Fuentes de Onoro and Vittoria. In the Battle of Toulouse in 1814, he opened the way for the British troops into the heart of France. The war was brought to a close by the abdication of Napoleon in April, 1814. For this masterful campaign and its brilliant successes, Wellesley received many Spanish and Portuguese titles, official thanks and large gifts from Parliament, and was created successively, viscount, marquis and Duke of Wellington.

In July, 1814, he was appointed ambassador to France, and the following year represented Great Britain in the Congress of Vienna. When Napoleon returned, Wellington took command of the allied forces in the Netherlands, and in the Battle of Waterloo he rode at the head of the army which shattered the last vestiges of Napoleon's power. He was placed in command of the army occupying France from 1815 to 1818, and became one of the most influential men in Europe.

After returning to England he occupied various positions of importance in the Cabinet. In 1827 he succeeded the Duke of York as commander-in-chief of the army, but resigned the next year to become Premier. His government became highly unpopular through its opposition to the Reform Bill, and in 1830 he was forced to resign. In 1841 Wellington again occupied a seat in the Cabinet, and the following year resumed command of the army. During the last years of his political career he favored reform and regained his popularity. At the time of his death, September 14, 1852, he was the idol of the British nation. He is buried under the dome of Saint Paul's. E.B.P.

Consult Hooper's *Wellington,* in English Men of Action Series; Morris's *Wellington,* in Heroes of the Nations Series.

**Related Subjects.** In this connection the reader may consult the following articles:

Blücher, Gerhard
Napoleon I
Vienna, Congress of
Waterloo, Battle of

**WELLS,** David Ames (1828-1898), an American educator, author and political economist, born in Springfield, Mass. He was educated at Williams College and at the Lawrence Scientific School of Harvard. His reputation as a political economist began in 1864 by the publication of his essay *Our Burden and Our Strength,* in which he discussed the nation's ability to pay debts and the resources of the United States. In 1866 he was appointed special revenue commissioner, and he was the first to collect economic and financial statistics for Federal use. Other published works include *Why We Trade and How We Trade, A Primer of Tariff Reform, Practical Economics* and *Recent Economic Changes,* published in the year of his death.

**WELLS,** Herbert George (1866- ), an English author whose very original and vigorous writings are a notable addition to modern literature. He was born at Bromley, Kent, of middle-class parents. As a schoolboy he made a brilliant record and won scholarships that enabled him to continue his education through London University. Before he became widely known as a writer for magazines he taught biology for a number of years.

In 1895 Wells produced the first of a series of fantastic stories of a purely imaginary character—*The Time Machine.* This was followed by *The War of the Worlds,* depicting the world invaded by gigantic creatures from Mars; *When the Sleeper Wakes,* showing the people enslaved by a huge trust; *The Food of the Gods,* a story of giants; and *In the Days of the Comet,* in which the human race suddenly reaches a higher moral plane. His interest in socialistic ideals is shown in *A Modern Utopia* and *First and Last Things.* The novels of Wells are enjoyable because the author makes his characters real and his narratives interesting. The fact that he presents many of his ideas on sociology and morality under the guise of a story does not detract from the charm of his books. His other works include *Tono Bungay, The History of Mr. Polly, The World Set Free, The Passionate Friends, The Research Magnificent, What is Coming?* and *Mr. Britling Sees It Through.* The latter, a story of an English soldier in the War of the Nations, was one of the best books inspired by the conflict in Europe.

**WELSBACH,** *vels'bahK,* Karl Auer, Baron von (1858- ), the man who invented the

Welsbach gas burner, which revolutionized methods of lighting by gas, was an Austrian inventor, born and educated in Vienna. Later he attended the University of Heidelberg, where he studied with Bunsen, the inventor of the Bunsen burner (see page 999). The Welsbach burner has about its nonluminous flame a cone-shaped, cotton-gauze mantle of oxides of thorium and cerium. When first lighted the cotton burns away and there is left a skeleton of the oxides. This becomes incandescent and throws out a strong, clear light. Welsbach also invented an incandescent electric lamp, and in 1907 discovered a new element known as lutecium. He is the author of several scientific works in the German language.

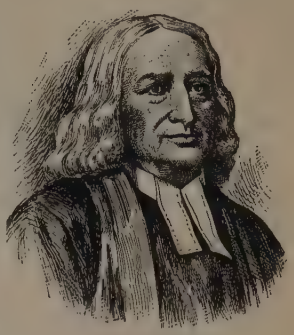
**WELWITSCHIA,** *wel wich'i a,* one of the strangest members of the vegetable kingdom, a plant bearing but two leaves. It often lives to be a hundred years old. It is named after F. Welwitsch, an Austrian botanist. The short, woody trunk, seldom more than a foot high, spreads its tablelike top to a width of five or six feet, until it somewhat resembles a gigantic, flattened mushroom. From the top spring two green, woody leaves two or three feet wide and about twice as long. These split into slender shreds and remain in that condition as long as the plant lives. Every year stiff, jointed, stemlike growths, from six to twelve inches in length, bearing scarlet flower spikes, develop at the point where the leaves join the trunk. The welwitschia grows in sandy soil in the southern part of Africa.

**WENTWORTH,** *went'wurth,* THOMAS, EARL OF STRAFFORD. See STRAFFORD, THOMAS WENTWORTH, FIRST EARL OF.

**WESER,** *va'zer,* a river which is formed in the Prussian province of Hanover by the union of the Fulda and the Werra, at Münden. It follows a winding northerly course through picturesque country, emptying into the North Sea through a wide estuary, 280 miles from the union of the head streams. In 1894 the river was deepened to Bremen, forty-six miles from the North Sea, greatly increasing its commercial importance. Such navigation as there was on the Weser was impeded by the rival claims of the provinces through which it flows until treaties were made in 1825. Hameln (modern form), the "Hamelin Town" of Browning's *Pied Piper,* is on its banks.

**WESLEY,** *wes'li,* the family name of two brothers whose lasting fame rests on the fact that they founded the religious sect which has developed into the powerful Methodist Church. John Wesley, four years older than his brother Charles, was the actual head of the movement, but Charles had no small part in its development.

**John Wesley** (1703-1791) was born at Epworth, England, June 17, 1703, the fifteenth child of Samuel Wesley, rector of Epworth. His mother was a woman of intelligence and deep religious life, and her influence upon the characters of her children was strong and lasting. John studied at Charterhouse School, and at Christ Church, Oxford, from which he was graduated in 1724. In the next year he was ordained to the ministry, but seems to have had at the time no very high spiritual conception of his calling. He was an active, "gay and sprightly" youth, with a great fondness for athletics. Gradually, however, while acting as his father's curate, his mind turned to more serious matters, and when in 1729 he returned to Oxford he became recognized as the leader of the "Holy Club," as the little circle which his brother Charles had gathered about him was derisively called.



JOHN WESLEY
Revered by Methodists as the founder of their Church.

*Influence of American Trip.* In 1735, with his brother Charles, he went to America as a missionary to Georgia, at the invitation of Oglethorpe, founder of the colony, but the work among the Indians was not successful, and Wesley lost popularity there by reason of his strictness. He returned home in 1738, having accomplished little of his original purpose, but the journey was by no means without significance in his own life, for on the voyage out he met a number of the Moravian Brethren whose calm faith convinced him that there was something in religion far beyond what he had attained. On his return to London he visited one of the Moravians, Peter Böhler, from whom he learned much of the necessity for "saving faith;" and in May, 1738, in a little meeting in Aldersgate Street, there occurred what Wesley himself considered the turning point in his career—there came to him a firm conviction of the saving power of Christ. A visit to the Moravian Brethren on the Continent confirmed him in his new faith, and on his return to England

he began, in conjunction with George Whitefield, his career as an evangelistic preacher.

*Beginnings of Methodism.* Before long the churches were closed against Wesley and his associates, and they spoke in the open air, gaining adherents in great numbers. The first building erected for their use was in the Horse Fair, in Bristol, and the first society formed by Wesley was in 1740. Lay preachers, or "class leaders," were appointed to have charge of little groups of converts, and the movement spread very rapidly. Wesley himself traveled on horseback fifteen to twenty miles a day, preaching three or four times, increasing, as his own faith and zeal grew, in his wonderful mastery over his audiences.

Meanwhile, he was an active helper in every worthy charitable or social movement, managing the business side of his enterprise and turning out a surprising amount of literary matter. He held the first conference with his helpers in 1744, but not until 1784 was the conference constituted the governing body of a new church separate from the Church of England. Before his death Wesley's actual followers numbered 120,000; more than 500 preachers were engaged in carrying on the work.

In 1750 Wesley married Mrs. Vazeille, a widow with four children; their habits and temperaments were wholly different, and Wesley could not reconcile himself to changes which would preserve family relations; hence a separation was agreed upon. Wesley's works numbered thirty-two volumes, published by himself, but he wrote much more which reached millions of readers in his time through other sources.

Always a man with abundant charm of manner, Wesley became as he grew older a more and more delightful companion. His brightness, his interest in all about him, his genial humor, never flagging, forced even those who opposed the new doctrines and the sect which grew out of them to respect and admire the man who instituted them.

**Charles Wesley** (1707-1788), an English clergyman and brother of John Wesley, was the early song writer of Methodism, and one of the founders of the Methodist Church. He was born at Epworth, in Lincolnshire and studied at Westminster School and Christ Church, Oxford. It seems to have been to him that the name of *Methodist* was first applied, not because of any religious observances, but because he was himself methodical in his manner of living and studying and was always urging his friends to be likewise.

In 1735, just after being ordained to the ministry, he sailed with his brother John as a missionary to Georgia, but did not remain long in the colony because the austerity of his life and the severity of the doctrines which he preached made him extremely unpopular. His "conversion" to the views which became his fixed principles and the foundation stones of the Church that was even then in the making dated from 1738, and in the next year he became an itinerant preacher, attracting wide attention and large audiences by the vigor of his message. Before all else, however, he was the song writer of the new Methodist movement, having produced over 6,000 hymns. Many of these are of little merit, but some rank very high and will ever be favorites with Protestant churches.

Charles Wesley was less extreme in his views than was his brother John, and viewed with disfavor the desire of the Methodists to separate themselves from the Anglican Church. A.MC C.

Consult Urlin's *Wesley's Place in Church History;* Taylor's *Wesley in Methodism;* Julian's *Dictionary of Hymnology.*

**WESLEYAN METHODISTS,** a sect which retains the Church organization originated by John Wesley. Wesleyans are found principally in the British Isles. After the War of Independence the Methodists in America adopted the episcopal form of Church government, and the organization became known as the Methodist Episcopal Church, as distinguished from the Wesleyan Methodist. The growth of the Wesleyan movement is told in these volumes under the heading METHODISTS. See, also, the article WESLEY, JOHN AND CHARLES.

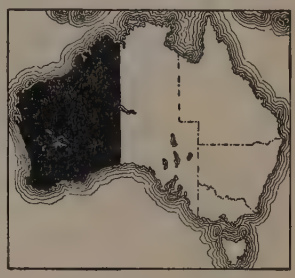
**WEST,** BENJAMIN (1738-1820), an early American painter, remembered especially for his historical canvases. West was practically self-taught in art. His first colors were made from leaves and berries, and his brushes were made of hairs from a cat's tail. His first historical painting, *The Death of Socrates,* was executed when he was sixteen years of age. In 1760 he went to Rome, where he attracted much attention with his *Cimon and Iphigenia,* and *Angelica and Medora.* In 1763 he visited England, where he was received so graciously that he determined to make London his future residence. For King George III, his constant friend and patron for almost forty years, he painted a series of twenty-eight religious paintings for Windsor Castle. In 1792 he succeeded Sir Joshua Reynolds as president of the Royal Academy, which he had helped to found.

Among his portraits is a well-known bust painting of Washington; one of the best of his mythological subjects is *Hector Parting with Andromache; Christ Healing the Sick* ranks among the finest of his religious paintings, and among his great historical paintings, *The Death of General Wolfe, Penn's Treaty with the Indians, The Black Prince at Poitiers* and *The Battle of La Hogue* won him greatest fame. Though West was greatly admired in his day, later critics regard his works as deficient in spirit and in imaginative power. His *Death of General Wolfe* was epoch-making in that the artist broke away from the old tradition of having the characters garbed in Greek and Roman costumes.

**WEST CHESTER,** Pa., a borough and the county seat of Chester County, situated in the extreme southeastern part of the state, twenty-seven miles west of Philadelphia, with which it is connected by an interurban line. It is on the Pennsylvania and the Philadelphia, Baltimore & Washington railroads. The population in 1910 was 11,767; in 1916, 13,176 (Federal estimate). Educational institutions of the city include a normal school, Saint Anthony's Boys' College and the Darlington Seminary, for young ladies. Features of interest are Everhart Park and Marshall Square, the latter containing botanical gardens; a Federal building, erected in 1907 at a cost of $80,000, a county courthouse and a county jail. Here are located extensive nurseries, wheel and engine works, a tag factory and large plants for the manufacture of dairy implements. West Chester was settled in 1784, and four years later was incorporated as a town. In 1799 it was chartered as a borough. Two miles distant is the historic Brandywine River, and in the vicinity are the battle grounds of Brandywine, Chadd's Ford and Valley Forge. F.J.W.

**WESTERN AUSTRALIA,** *aws tra' li a,* the largest and most thinly-populated state of the Australian Commonwealth, occupies the western third of the continent. In this vast territory, with an area of 975,920 square miles, there are only 319,859 inhabitants (estimate of 1915); the density of population is thus about one person to three square miles. There are large sections in the interior quite unpopulated, and the chief towns are in the coast regions. They include Perth, the capital; Fremantle, its port on the Indian Ocean; Boulder, Kalgoorlie and Albany.

**Physical Features.** The coast line, which has a total extent of about 5,200 miles, has very few indentations, or natural harbors. The most important mountain range, the Darling, which has an elevation of 1,500 feet, skirts the southwestern coast. This range, however, does not contain the highest summit in the state; that distinction belongs to Stirling Range, forty miles inland, whose loftiest elevation, Bluff Knolls, is 3,640 feet above the sea. The interior is a plateau varying in altitude from 700 to 1,000 feet, and the greater portion of it, with the exception of small areas, is practically sterile, being a part of the great sandy desert which occupies the middle of the Australian continent. Western Australia has few rivers of importance. The largest, the Murchison, Gascoyne, Ashburton and Fitzroy, are in the west.



LOCATION MAP
The state occupies nearly a third of the Australian continent.

**Natural Resources.** Western Australia has a very hot and very dry climate. Regular and abundant rainfall occurs only in the southwestern regions of the state, where the fall averages thirty inches a year; in other regions barely ten inches a year are registered. In these southwestern regions large quantities of wheat, barley, corn, oats, potatoes and hay are raised. Extensive tracts of good grazing land for cattle and sheep are also found here, and the number of cattle and sheep raised has increased greatly during recent years. The wool clip amounts to over 25,000,000 pounds a year.

Extensive forests constitute one of the principal sources of wealth. There are many varieties of eucalyptus, or gum trees, some of which are of gigantic proportions. Of still greater importance is the mineral wealth of the state, especially gold. The value of the yearly output of this metal is about $25,000,000, and is destined to increase. The chief gold fields are in the Coolgardie and Kalgoorlie districts. Other minerals mined are copper, tin and coal.

**Government and History.** Western Australia is governed by a chief executive, appointed by the British Crown, and by a Parliament consisting of a legislative assembly and a legislative council. The former consists of fifty members elected for three years, and the latter of thirty members elected for six years. Both women and men have suffrage rights. The

government operates about 3,000 miles of railway. This part of Australia was first visited by Europeans in the sixteenth century; the first English settlement was made in 1825. Colonization on a systematic plan began in 1829. Western Australia entered the Australian Commonwealth in 1901. See AUSTRALIA.

Consult Vivienne's *Travels in Western Australia;* Chambers' *Western Australia.*

**WESTERN RESERVE,** *re zerv'*. When, in 1786, Connecticut gave up to the new United States government the great stretch of western land which, according to the original charter, had been part of the colony, it retained a strip about seventy miles wide, which was named the Western Reserve, extending westward from the boundary of Pennsylvania about 120 miles; it later became the northeastern part of Ohio. The greater part of this territory was sold in 1795-1796 for $1,200,000 to the Connecticut Land Company, and the proceeds were invested as a school fund. The new land was surveyed, and settlement began at once; in time some of the most flourishing counties of Ohio were formed from this territory. In Cleveland, the largest city in the district, there is a university, the Western Reserve, which preserves the old name.

**WESTERN RESERVE UNIVERSITY,** an institution of higher learning founded in 1826 in Hudson, Ohio, under the name of Western Reserve College, and in 1882 removed to Cleveland and given its present name. It was one of the earliest colleges of the state, and since its foundation has developed into one of the great universities of the Middle West. The main campus, a beautiful tract of thirty-six acres, occupies an attractive site in Cleveland's park district. The university is organized into the following departments: Adelbert College; Men's College; the College for Women; Department of Graduate Instruction; graduate schools of law and medicine; the Library School; schools of dentistry and of pharmacy; the School of Applied Social Sciences; the School of Education and the summer session. There is a faculty of about 265, and the student enrolment is over 2,200. The library contains 122,000 volumes.

**WESTFIELD,** MASS., a town in Hampden County, in the southwestern part of the state, noted for its extensive manufacture of whips, in which it ranks first among the cities of the United States. It is situated on the Westfield and Little rivers, in the beautiful Berkshire Hills, nine miles west of Springfield, 108 miles southwest of Boston and 120 miles northeast of New York. It is served by the Boston & Albany and the New York, New Haven & Hartford railroads. Interurban lines are in operation to Springfield, Holyoke, Huntington, Russell, Woronoco and the larger cities in Western Massachusetts.

Westfield was settled in 1669 on the site of the Indian village of Woronoco. It is composed of several small villages. The population in 1910 was 16,044; in 1916, 18,391 (Federal estimate). The town has a Federal building, completed in 1913 at a cost of $106,000, a state normal school, a high school, Westfield Athenaeum, a public library and Noble Hospital. Woronoco Park provides recreation for the people. Besides sixty whip factories which employ about 1,100 people and have a daily output of more than 72,000 whips, the town has motorcycle, bicycle and cigar factories, paper mills, and plants for making heating apparatus.

**WEST HOBOKEN,** N. J., adjoining Hoboken, on the Hudson River, is a manufacturing town in Hudson County. It is less than one square mile in area, but had a population of 35,403 in 1910, and of 43,139 in 1916 (Federal estimate). The Monastery Church and Carnegie Library are prominent features. Silk and silk goods are extensively manufactured, and other factory products are embroideries, gloves, artificial flowers, feathers, brush handles and braid. Flowers and plants are cultivated on a large scale. West Hoboken was a part of Bergen until 1863, when it became a separate incorporation.

**WEST INDIES,** *in' diz,* the first land sighted by Columbus, and thought by him to be a part of India, is a group of islands between North and South America, separating the Caribbean Sea and Gulf of Mexico from the Atlantic (see map, page 283). They are the summits of a submerged mountain chain, and many of them have been formed by volcanoes. The West Indies are often called the *Antilles* by Europeans. Although extending over an area nearly 2,000 miles from east to west and more than 1,000 from north to south, if gathered together they could be put into a space about 300 miles square. The largest island, Cuba, is independent; Haiti and Santo Domingo, two independent governments on one island, are under the financial supervision of the United States. Saint Thomas, Saint John and Saint Croix, formerly known as the Danish West Indies, were purchased by the United States in 1917

and named Virgin Islands. Porto Rico has been an American possession since 1898. The other islands are colonies, the most important of which are the following:

BRITISH: Bahamas, Jamaica, Trinidad, Barbados, Leeward Islands, Windward Islands, Turks.
DUTCH: Curaçao.
FRENCH: Guadeloupe, Martinique.

Most of the six and one-half million people on the islands are of African ancestry, although white people rule everywhere except in Haiti. For several centuries the islands were associated with the slave trade. The blacks have made little progress since being freed, but many thousands of them who were employed on the construction of the Panama Canal have received a new outlook on the world which is sure to result in their advancement. The principal products of the islands are sugar and fruit.

**Related Subjects.** The reader may gain from the following articles in these volumes detailed information as to the islands that comprise the West Indies:

| | |
|---|---|
| Antilles | Leeward Islands |
| Bahama Islands | Martinique |
| Barbados | Porto Rico |
| Cuba | Santo Domingo |
| Curaçao | Trinidad |
| Guadeloupe | Virgin Islands of the United States |
| Haiti | Windward Islands |
| Jamaica | |

**WEST INDIES,** DANISH, the name formerly applied to a small group of islands lying east of Porto Rico. In 1917 they were purchased from Denmark by the United States, and are now known as Virgin Islands of the United States. They are described in these volumes under that heading.

**WEST'INGHOUSE,** GEORGE (1846-1914), an American capitalist and manufacturer, who invented the air brake now known by his name. It is considered the greatest life-saving device the world has yet seen. He was born at Central Bridge, N. Y. While studying in the public schools of Schenectady he found time to work in his father's large manufactory for agricultural machinery, and early revealed mechanical and inventive skill. During the War of Secession he served for two years in the Union army, and in 1864 became assistant engineer in the United States navy. The following year he registered as a student of Union College of Schenectady.

The first invention of Westinghouse was a railway frog, a movable device by which a train passes from one track to another. Gradually his attention was directed to brakes and the impracticability of using steam for a power brake. Experiments with compressed air led to the invention of the air brake in 1868, and it was later perfected. Westinghouse encountered great difficulties in getting his air brake adopted. His idea was greeted with ridicule, one well-known financier and railroad magnate telling him that he could not expect to stop a train with wind. However, so great was the instant success of the air brake when installed that the scoffers who had refused to listen to the claims of the inventor were afterwards compelled, at enormous cost, to adopt the Westinghouse air brake throughout their vast railway systems. Large works for the production of his inventions were established, first at Pittsburgh and later in many parts of Europe.

Other devices patented by him were improvements in railway signaling, the use of the alternating instead of the direct current for power and lighting on a large scale, a method used in the Chicago Exposition of 1893, and for long-distance transmission of power. All of the plants for the manufacture of the Westinghouse products are organized with a high degree of efficiency, and represent large capitalization.

Among honors bestowed upon him were the Order of Leopold, from the king of Belgium, the Royal Order of the Crown of Italy, and the decoration of the French Legion of Honor.

**WESTMIN'STER AB'BEY,** a church in London, one of the most famous in all the world. It is in no sense an abbey, but is so called because it stands on the site of the old Benedictine monastery, or abbey (see ABBEY). The present structure was practically completed in the thirteenth century, and replaced a church of two centuries earlier which had been erected by Edward the Confessor. Numerous and important additions and alterations were made later; Henry VII in the sixteenth century built the beautiful chapel which bears his name, and the west towers were added in the eighteenth century by Sir Christopher Wren. In form, as it stands to-day, the Abbey is a Latin cross, 423 feet in length. The body of the church is 102 feet in height, and the towers are 225 feet. Both within and without, the church is imposing in proportions and in style.

It is not, however, by reason of its architectural beauties that Westminster Abbey is celebrated; it is a very real part of the history of the English people. All the English kings from the time of William the Conqueror (1066), except Edward V, have been crowned there, and

in the chapel of Edward the Confessor there is kept the old Coronation Chair, with the Stone of Scone, brought from Scotland and by legend declared to be the stone which the patriarch Jacob used as a pillow (see CORONATION, subhead *Coronation Chair*). Burial in Westminster Abbey is one of the greatest honors which England can bestow, and sovereigns, as well as many of the greatest of their subjects, lie there. Henry VII, Elizabeth, Mary Queen of Scots, Charles II, William and Mary, James I, and other kings and queens are interred in the chapel of Henry VII, which is specially reserved for royalty; Warren Hastings, Fox, the elder and younger Pitt, Wilberforce and numerous other statesmen lie elsewhere in the Abbey. Perhaps the most sacred as well as the most interesting spot is the so-called Poets' Corner, in the south transept. Here are buried Chaucer and Spenser, Goldsmith, Gray, Dryden and others of the great poets of England, while near by lie Dickens, Thackeray, Butler, Johnson, Addison and other famous men of letters. Not all, of course, of England's great writers are buried here, but for those who are missing memorial tablets or statues have been erected. Among the latter stands a bust of Longfellow, the only American who has been so honored. A.MC C.

Consult Lofties' *Westminster Abbey;* Pratt's *Westminster Abbey.*

**WESTMINSTER HALL,** a building adjoining the British Houses of Parliament, a part of the old Palace of Westminster. It was built —or rather rebuilt to replace an earlier structure destroyed by fire—by Richard II, and is a great room 290 feet long, sixty-eight feet wide and ninety-two feet high. Architecturally, its most interesting feature is its carved wooden ceiling, accounted among the most wonderful structures of its kind in the world. Historically, the Hall is noted as the scene of many great events. Here More, Lady Jane Grey, Strafford and Warren Hastings were brought to trial, and here Charles I was condemned to death. In this room, too, Cromwell was installed as Lord Protector of England. At the present time the building serves as a vestibule to the Houses of Parliament.

**WESTMOUNT,** a city in Quebec, in Hochelaga County. It is a suburb of Montreal, and is almost exclusively residential in character. It has a number of notable church edifices, and the public library and the city hall also deserve mention. The electric-lighting plant is owned by the city. Population in 1911, 14,579; in 1916, estimated, 15,800.

**WEST ORANGE,** N. J., in Essex County, sixteen miles west of New York City, is a residential town, attractively situated along the side and at the foot of Orange Mountain. Eagle Rock (600 feet) commands splendid views of the neighborhood and of New York City and harbor. Railroad transportation is provided by the Erie and the Delaware, Lackawanna & Western railroads, and by interurban lines. The two most noteworthy features of the town are Llewellyn Park, a beautiful residence section, and the large electrical plants owned by Thomas A. Edison. The latter were partially destroyed by fire in 1914, but were immediately rebuilt. In 1910 the population was 10,980; in 1916, 13,550 (Federal estimate).

**WEST PALM BEACH,** FLA. See subhead, under PALM BEACH.

**WESTPHALIA,** *west fa'li a,* a province of Prussia, ranking first among the states of that kingdom in the production of iron, zinc and copper. It is also an important center for the production of coal, lead, stone and salt.

LOCATION MAP

Westphalia has an area of 7,804 square miles and a population (census of 1910) of 4,125,096. The manufacturing industries are well developed, and the province has prosperous manufactories of metal wares, linens, cotton and woolen goods and hosiery. Though Westphalia is not a foremost agricultural state, its farms yield profitable crops of rye, oats, potatoes and flax. At Münster, the capital of the province, is the Academy, which stands at the head of the Westphalian system of education.

**Peace of Westphalia.** This is the name given the treaty which concluded the Thirty Years' War (which see). The general peace terms were signed in October, 1648, in the city of Münster. Two important matters of dispute were settled—the religious status of the Ger-

man states and certain territorial questions. Roman Catholics, Lutherans and Calvinists were given equal rights, and with certain exceptions the prince of each German state was authorized to determine the religion of the people under his jurisdiction. Those who dissented from the established religion were to be permitted to emigrate within five years.

The independence of Switzerland and of the United Netherlands was formally recognized. Western Pomerania, which belonged to Brandenburg, was ceded to Sweden, and Brandenburg given certain cessions of territory as compensation. One of the most important provisions of the treaty was one which decreed the cession of Alsace to France and confirmed that country's claim to the three bishoprics in Lorraine. Three hundred years later, in 1871, Germany wrested from France the Alsatian lands and left in the hearts of the French a bitter feeling that broke out afresh in the great war of 1914. Of the Peace of Westphalia the historian Myers says:

> It stands at the dividing line of two great epochs. It marks the end of the Reformation period and the beginning of that of the political revolution. Henceforth, speaking broadly, men will fight for constitutions, not for creeds.

**WEST SPRINGFIELD,** Mass., a town in Hampden County, in the west-central part of the state. It is on the Connecticut River, opposite Springfield, of which it was a part until its separate incorporation in 1774. Within the city limits are several villages, and the place contains the homes of many Springfield business men. Interesting features are a park, a town hall, public library and the old Day House. Repair shops of the Boston & Albany Railroad, paper mills and cigar factories are the chief industrial establishments. The population, which in 1910 was 9,224, was 10,555 in 1916 (Federal estimate). See Springfield (Mass.).

**WEST'VILLE,** a town in Pictou County, Nova Scotia, in the north-central part of the province. It is on the Intercolonial Railway, five miles west of New Glasgow and ten and one-half miles south of Pictou. Like most of the towns in this part of Pictou County, Westville is important chiefly for its coal mines. Saw mills and brick yards are of secondary importance. Westville was founded in 1866, and was incorporated in 1894. Population in 1911, 4,417.

**WEST VIRGINIA,** one of the South Atlantic states, the only one in that group which is entirely cut off from the sea. The state was war-born, and came to be known as the "storm child" of the War of Secession. Its inhabitants, not sympathizing with Virginia in the secession movement of 1861, separated from the parent state, and adopting the motto, "Mountaineers are always free," organized a new commonwealth. It is popularly known as the Panhandle State, from its irregular projections extending northeast between Maryland and Virginia and north between Ohio and Pennsylvania. The rhododendron, a wild shrub of the mountains, has been chosen as the flower emblem.

**Location and Size.** The state occupies an irregular area on the west slope of the Appalachian Mountains between Virginia and Kentucky. By nature it seemed destined to become an individual commonwealth, since it is cut off from the surrounding states by natural boundaries of mountain ridge and river.

Having an area of 24,170 square miles, it ranks fortieth in size among the states; it is slightly smaller than South Carolina, but almost twice as large as the next smaller state, its neighbor, Maryland; it is greater in size than the combined areas of the two Canadian provinces of Nova Scotia and Prince Edward Island.

**The People.** The native inhabitants of the state are for the most part descendants of Virginia mountaineers and hardy pioneers from Maryland, Pennsylvania, Ohio and Kentucky. In the government census of 1910, West Vir-

ginia had a greater percentage of native-born population than any other state in the Union.

The industrial development of the state has caused a steady increase in the population, and in 1910, with 1,221,119 inhabitants, it ranked twenty-eighth in population among the states. The average number of inhabitants per square mile was 50.8, a density which is exceeded in only fourteen states. The estimated population on January 1, 1917, was 1,399,320. There are over 64,000 negroes, but only 4.7 per cent of the population is foreign born. Of the foreigners, Italians, Austrians, Germans, Hungarians, Russians, English, Irish and Scotch are most numerous.

Although only 18.7 per cent of the population is urban, the number and size of the cities are steadily increasing. According to a Federal estimate in 1916 Huntington, the largest city, had over 45,000 inhabitants, and Wheeling had more than 43,000. Other important cities are Charleston, the capital; Parkersburg, Bluefield and Martinsburg.

Among the religious bodies, the Methodists have the greatest number of adherents; other prominent denominations are the Baptists, Roman Catholics, Presbyterians, Disciples of Christ and Lutherans.

**Education.** The school system is organized on the district plan, and is under the administration of a state superintendent. Free education is provided for all of school age, and for children between the ages of eight and fourteen years education is compulsory. Separate schools are maintained for white and colored pupils, and about three-fourths of the total school population is enrolled. In 1910, 8.3 per cent of the inhabitants were unable to read and write, this proportion being lower than that in any others of the Southern states except Maryland and Delaware. Agricultural education has been introduced into the rural schools and into many of the high schools, and the state extension department of agriculture has established extension schools in several counties and has organized boys' and girls' clubs throughout the state.

There is a state supervisor of high schools, appointed by the superintendent, and as a result of the recent campaign for more secondary schools there are about 150 high schools in the state. Preparatory schools affiliated with the university are maintained at Keyser, Montgomery and Morgantown; there are state normal schools for white teachers at Athens, Huntington, Fairmont, West Liberty, Glenville and Shepherdstown, and training schools for colored teachers at Bluefield, Institute and Harper's Ferry. The state university is located at Morgantown and includes agricultural and mechanical colleges. Prominent private institutions of higher education are Allegheny Collegiate Institute at Alderson, Bethany College at Bethany, Broaddus Institute at Clarksburg, Davis and Elkins College at Elkins, Lewisburg Seminary at Lewisburg, Linsly Institute at Wheeling, Morris Harvey College at Barboursville, Salem College at Salem, and West Virginia Wesleyan University at Buckhannon.

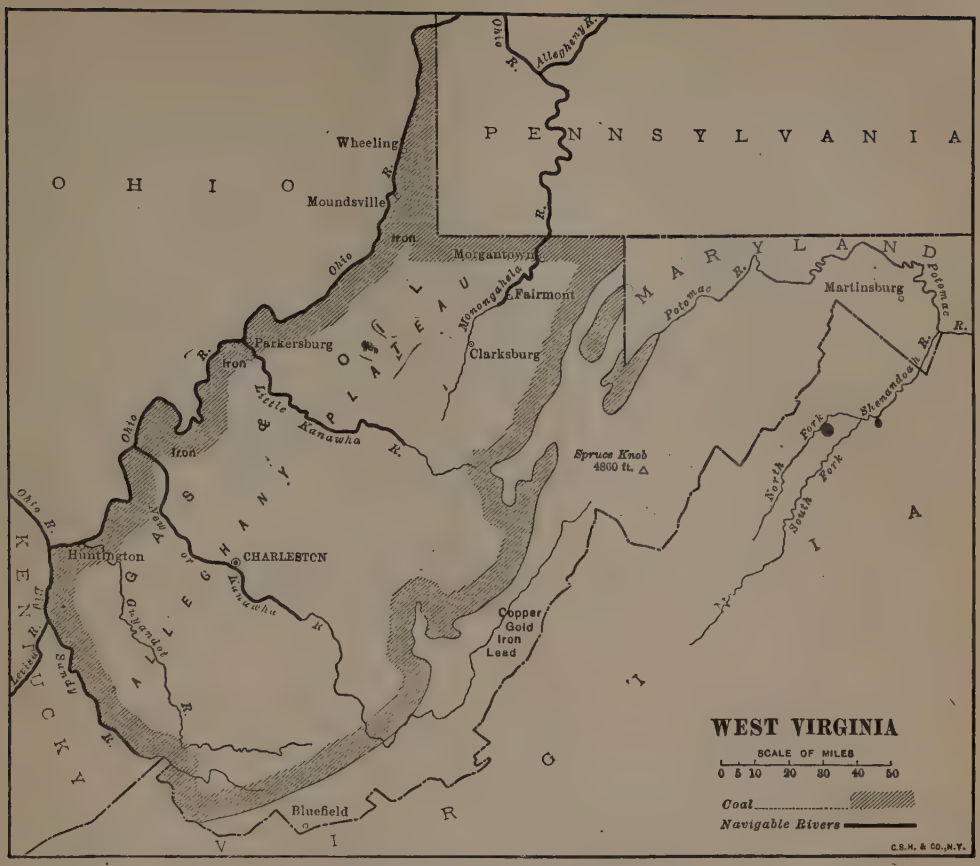
**Charities and Corrections.** At the beginning of its statehood West Virginia had no charitable or reformatory institutions within its boundaries, but generous provision is now made for the care of the defective and dependent classes. There are hospitals for the insane at Huntington, Spencer and Weston; miners' hospitals at Fairmont, McKendree and Welsh; a hospital for incurables at Huntington; a tuberculosis sanitarium at Terra Alta, and a school for the deaf, dumb and blind at Romney. The penal institutions include an industrial home for girls at Salem, one for boys at Pruntytown, and a penitentiary at Moundsville.

**The Land.** A lover of West Virginia has described it thus:

> Secured against Atlantic's chilly blast
> By Alleghany's steadfast mountain crest,
> It slopes through hill and dale and meadow vast
> To where a noble river on the west
> Laves a low strand.

The state has been termed "a realm of beautiful modulations," and may be divided into four mountainous or rolling regions: the Potomac valley in the northeast panhandle, the Alleghany plateau, the Cumberland plateau and the Ohio valley. The broad, rolling meadows of the Potomac and Shenandoah valleys gradually rise from an elevation of only 260 feet above the sea at Harper's Ferry, on the extreme eastern border, to the wooded foothills of the Alleghanies, which extend from northeast to southwest across the eastern half of the state. Here regular mountain folds rise one above another or extend in parallel ridges, their rounded, domelike peaks separated by a network of broad valleys. Spruce Knob, in Pendleton County, 4,860 feet in height, is the highest point in the state, and with the surrounding peaks is known as the "birthplace of rivers."

In the Cumberland plateau the valleys narrow into deep gorges, and rocky precipices




OUTLINE MAP OF WEST VIRGINIA

Showing boundaries, navigable rivers, principal cities, mining centers, and the highest point of land in the state.

tower above the deep canyons cut by rushing streams. At "Hawks Nest," where the Kanawha River dashes through its wildest gorge, the sheer wall of rock rises 1,292 feet above the stream. Where the rivers leap from the higher levels of the rugged plateau to the lower hills of the valley region, they form picturesque falls and swift rapids. A succession of rounded hills and broad, fertile valleys extends westward from the plateau region to the Ohio River.

**Rivers.** There are two river systems in the state, one flowing eastward, swelling the current of the Potomac and reaching the Atlantic through Chesapeake Bay, the other, larger and more important, flowing westward to the Ohio and thence to the Mississippi and the Gulf of Mexico.

The Potomac flows along the northeast boundary of the state, cutting a beautiful gap in the Blue Ridge Mountains at Harper's Ferry, where it is joined by the Shenandoah. Its principal tributaries in West Virginia are the North and South branches, which flow north between the eastern mountain ridges.

The Ohio, which forms the western boundary, is fed by many important rivers—the Big Sandy, winding around the southwest corner of the state; the Guyandot; the Great Kanawha, rising in the mountains of North Carolina, where it is known as the New River, and flowing across the state through the rich coal and timber regions; the Little Kanawha; lastly, the Monongahela, which flows north through Pennsylvania and joins the Allegheny at Pittsburgh to form the Ohio. These tributaries are fed by many smaller streams. Besides their great importance in the drainage and transportation of the state, these rivers, together with many mountain torrents and springs, have economic value because of the vast amount of power they furnish.

**Climate.** Owing to the wide range in elevation there is considerable variation in temperature, but the climate is nowhere severe. The

mean annual temperature at Morgantown is 54°. The annual rainfall averages about forty-five inches, and is everywhere sufficient for agriculture and for luxuriant vegetation. The cool, invigorating summers, the numerous mineral springs and the beautiful scenery have made the mountainous regions popular as health and pleasure resorts; White Sulphur Springs, in Greenbrier County, is one of America's famous watering places.

**Agriculture.** In spite of West Virginia's rough surface and dense forests, considerable headway has been made in agriculture. Over one-half of the farm area, which covers about sixty per cent of the state, is improved. The fertile valley in the northeast and the Ohio valley are the chief farming sections.

Corn is grown in every county and is by far the most important crop, the annual production exceeding 25,000,000 bushels. Hay, especially timothy, and wheat, potatoes, oats, tobacco, buckwheat and rye are other leading crops. Market gardening is profitable along the Ohio River near the large industrial centers and in the bottoms of other western streams, and large quantities of vegetables and small fruits are grown. Sugar crops, including sorghum cane and beet sugar, are raised, and the culture of flowers, plants and nursery products is important. Orchards are especially productive in the eastern and northern panhandle sections. The state is famous as the home of the Grimes' Golden apple, and nine-tenths of the value of orchard crops is the income from apples; peaches are grown with much success and constitute most of the remaining value of orchard fruits. The grassy slopes of the mountains and hills furnish pasture land for live stock, and in the blue-grass regions of the southeastern counties dairy farming is important.

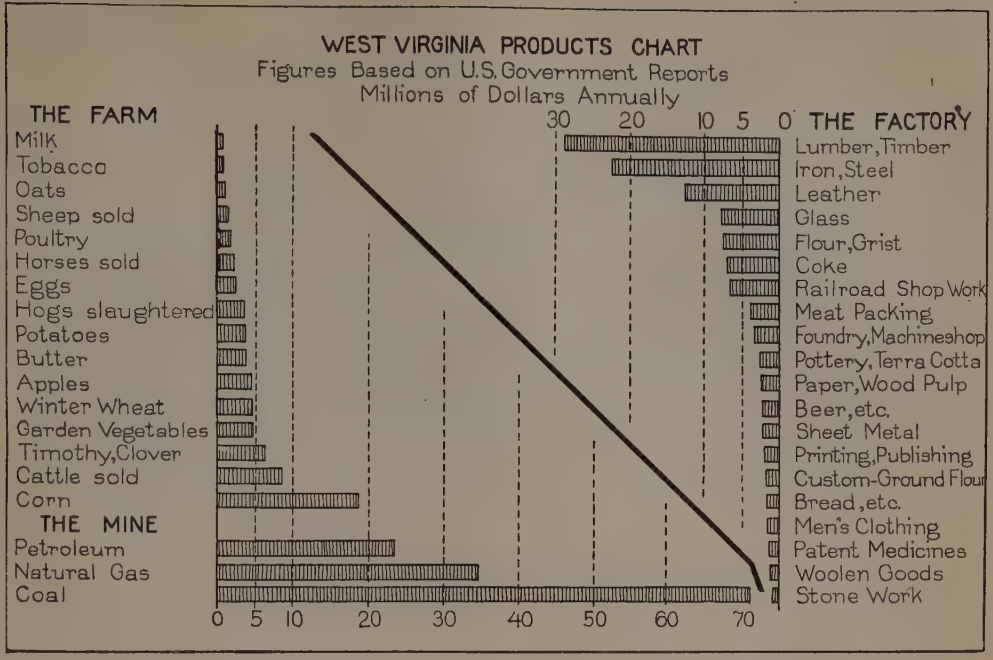
**Forests.** The state was formerly a vast primeval forest, penetrated only by the streams and Indian trails. About seventy per cent of the area still remains virgin woodland. The higher mountains are clothed with white pine, hemlock and spruce, and the lower slopes are covered with dense forests of oak, chestnut, hickory, cherry, poplar, sycamore, elm and other trees. Oak is the principal timber product, and in chestnut and cherry the state surpasses all others in the Union.

**Mining.** West Virginia is next to Pennsylvania in the value of mineral products. The coal fields cover an area of 17,280 square miles, which is 1,480 square miles greater than the area of the Pennsylvania fields, and have an estimated available supply of over 150,300,000,000 tons. However, the coal-mining industry in West Virginia is still in its infancy, and the annual output is surpassed by that of Pennsylvania. The production has increased each year, and now amounts to more than 90,000,000 tons annually. Over 78,000 miners are employed in the coal mines, and new areas are constantly being opened. The coal is obtained chiefly by drift mining, that is, it is reached by an opening in the mountain side rather than by deep shafts.

The state also possesses extensive gas and oil fields. It is not surpassed among the states in the output of natural gas, its annual production exceeding $35,000,000 in value. The largest gas-pumping station in the world is located at Hastings, in Wetzel County, and all the principal towns west of the Alleghanies, including many industrial centers in Ohio and Pennsylvania, are supplied with this fuel. The oil production, which exceeded 11,750,000 barrels in 1910, decreased to about 9,100,000 barrels in 1915, giving the state sixth place among the oil-producing states.

Other important mineral products are clays, glass sands, limestone, sandstone and marble; salt brines and brown iron ore are obtained in small quantities.

**Manufactures.** In a state so abundantly supplied with coal and natural gas, the great fuels of the world, and with such a large amount of available water power, the manufacturing industries are destined to become great interests. The manufacture of lumber and timber products, in the output of which West Virginia ranks tenth among the states in the Union, is the chief manufacturing industry. Second in importance is the iron and steel industry, which centers at Wheeling, the chief manufacturing city. The plentiful supply of oak and hemlock bark has encouraged the establishment of large tanneries, and in the output of tanned leather products the state ranks ninth in the Union. In the manufacture of tin plate and terneplate West Virginia is surpassed only by Pennsylvania. The state also ranks high in the manufacture of glass, large plants being located at Wheeling, Morgantown, Clarksburg and Buckhannon. Associated with the natural-gas industry is the manufacture of lampblack and bone carbon, in which West Virginia holds first place among the states. It holds second rank in the output of galvanized ware and iron and steel pipe, and is third in the production of coke. There are various




other large industries, including oil refineries, pottery works and tobacco factories; the ax factory at Charleston is said to be the largest in the world.

**Transportation.** The state has almost 600 miles of navigable waterway. The Ohio, extending for nearly 300 miles along the western boundary, serves as a natural highway for traffic to the West and South. The Monongahela and the Great Kanawha have been improved by the building of locks and dams and by the deepening of their channels, and are important in the transportation of coal from the interior to the Ohio. The Little Kanawha, Big Sandy and Guyandot are carriers for logs, and great shipments of lumber are floated down to the Ohio.

For many years West Virginia was greatly hampered by the lack of railroads, but there are now over 3,700 miles of track, the principal lines being the Norfolk & Western, the Western Maryland, the Virginian Railway, the Pennsylvania, and the Coal & Coke Railroad. Interurban lines cover about 300 miles. There are over 31,000 miles of public road in the state, but owing to the mountainous character of much of the land only a little over 800 miles are surfaced. A bureau of roads was established in 1913, and the improvement of highways is now rapidly progressing.

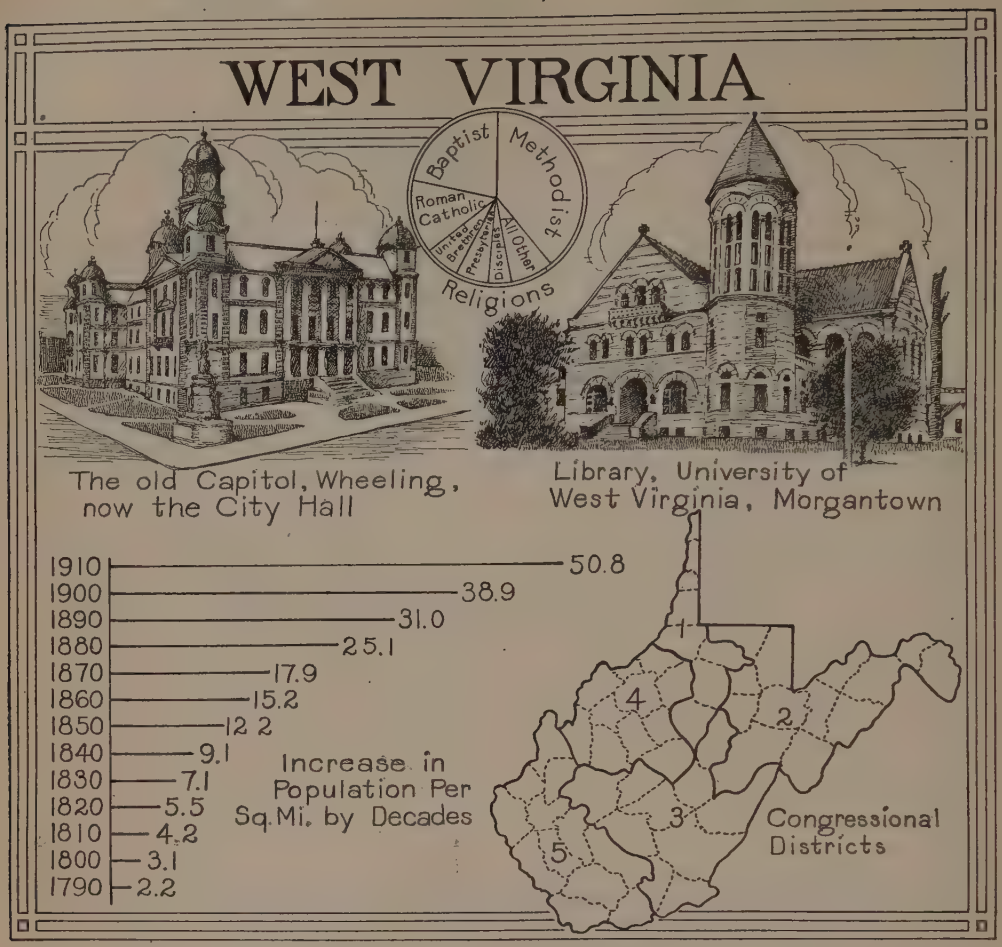
## *Government and History*

**Government.** The present constitution, the second one of the state, was adopted in 1872. All male citizens residing in the state one year and in the county sixty days have the right to vote. Constitutional conventions may be called with the approval of a majority in each house and the majority of the voters, and amendments become effective if approved by two-thirds of the members of each house and a majority of the people.

The *executive department* consists of a governor, secretary of state, treasurer, attorney-general and superintendent of free schools, each elected for four years. Together these officers constitute the board of public works. The governor may not serve two successive terms.

The *legislature* is composed of a senate of thirty members and a house of delegates of eighty-six members. Senators are elected for four years, one-half of the body being chosen every two years; delegates are elected for terms of two years.

The *judiciary* consists of a supreme court of appeals with five judges, and twenty-two circuit courts, thirty-eight courts of limited juris-




diction, county and city courts and justices of the peace. Supreme court judges are elected for twelve years and judges of the circuit courts for eight years.

The county is the unit of local government. Workmen's compensation acts and child-labor laws have been passed; statewide prohibition went into effect in 1914, and the shipping of liquor into the state and its use in public places are forbidden.

**Steps toward Statehood.** The organization of West Virginia was the result of a double rebellion of 1861—that of the state of Virginia against the Union and that of the northwestern counties against the mother state. (For early history see the article VIRGINIA.) Many years before the War of Secession, which brought about a permanent separation, the two sections into which the Alleghany Mountains divided the state of Virginia differed commercially, politically, and in the sentiment relating to the questions of slavery, taxation and public expenditure. Commercially the two sections reached out in opposite directions, the eastern trade being carried to the Atlantic and the commerce of the trans-Alleghany section finding its only outlet through rivers flowing west. The landed aristocracy of Eastern Virginia, who formed the larger part of the population and held the controlling power in state affairs, opposed the public improvements desired by the western pioneers.

These and many other questions of local interest caused constant friction. When the ordinance of secession was submitted to the people, it was opposed by a large majority in the northwestern counties. After its adoption in April, 1861, by the state of Virginia, the unionist counties declared their independence, and in August provided for the formation of a new state, to be named "Kanawha." In a third convention, in November, a constitution was

# *RESEARCH QUESTIONS ON WEST VIRGINIA*

**(An Outline suitable for West Virginia will be found with the article "State.")**

What event in its early history gave West Virginia the right to the popular name of the "storm child?"

What other popular name does it bear? Why? Examine the map of the United States and find other states which might be called by this same name.

What is the state motto? The state flower? Describe the flower. Where is it found in greatest abundance?

What other state has adopted the same floral emblem? (See article FLOWERS, subtitle *State Flowers,* page 2227.)

Of what other state was this region once a part? What difference in opinion accounted for the separation?

How many states are larger than West Virginia?

How many of these larger states have a greater population? (See table of statistics with article UNITED STATES.)

How does West Virginia rank among the states with reference to its percentage of foreign-born inhabitants?

How many inhabitants are there, on the average, to the square mile?

How does the state compare in this respect with each of its neighboring states? With the United States as a whole?

What event that was of great importance in the years just preceding the War of Secession took place within the limits of this state?

Where are the "Painted Rocks," and why are they so called?

How far could you travel within this state in a straight line? In which direction would you go?

What is the "noble river" which "on the west laves a low strand?" Where is its outlet?

How does the loftiest elevation compare in altitude with the highest point in each of the states upon which West Virginia borders?

How have the rivers helped to determine the industrial development of the state?

What and where is the "birthplace of rivers?"

What is the difference between *drift* and *shaft* mining? What advantage does the former possess?

Compare the climate of West Virginia with that of Kansas, which is in the same latitude. How do you account for the differences?

About what proportion of the total area is improved farm land?

How does West Virginia resemble Illinois in relative value of crops? How do the two compare in value of chief crop?

How does West Virginia rank among the states in value of mineral output? To what group do the three chief mineral products belong?

What industry besides the making of lumber and timber products is dependent upon the wooded character of the state?

In what other important points besides their attitude toward slavery did the two sections of Virginia differ before the War of Secession?

What was the new state first called? How long did it bear this name? What was its attitude in the War of Secession?

What question concerning Virginia and West Virginia played a part in politics for more than a half century after their separation? When and how was it settled?

framed and the name of the new state was changed to West Virginia. The constitution was adopted by the people in 1862, and Virginia having given her consent, West Virginia was admitted to the Union on June 19, 1863.

**Statehood.** The new state furnished more than its quota of troops to the Federal armies, and while it was struggling toward independent statehood war was raging within its borders. A political revolution followed the period of reconstruction, and a new constitution was adopted in 1872. Meanwhile, an economic revolution was gradually changing the industrial character of the state and was resulting in a rapid growth of industry and population.

At the time of separation from the mother state, West Virginia loyally assumed its share of the old state debt, and the question continued to be a prominent issue in state politics until 1915, when an adjustment was made which placed West Virginia's liability at $12,393,929, with interest reckoned at $8,178,000.

**Other Items of Interest.** West Virginia's metropolis and chief industrial center, Wheeling, is frequently referred to as the "Nail City," because of its extensive manufacture of nails and allied steel and iron products.

It was within the bounds of the territory which later became West Virginia that John Brown's famous raid at Harper's Ferry took place in 1859.

In Grant County there is a large cliff of white sandstone which bears the name of "Painted Rocks," for on its face appears a group of roughly outlined animals—deer, buffaloes, bears, snakes—almost all the animals of the region, in fact. These drawings were discovered by the first white men who visited the regions, but no clew has ever been found as to the race or date of the artist.

The longest journey which one could take in a straight line within West Virginia is about two hundred seventy miles, from Harper's Ferry in the northeast to Kenova in the southwest.

West Virginia has more streams than most other states of the Union, but much less water surface, for there are no lakes.

The region of Spruce Knob has many mountain springs, some of them large enough and possessed of force enough to supply power for mills.

Since the coal measures are for the most part horizontal and crop out on the sides of the river valleys, most of the mining is drift mining and not shaft mining. That is, lateral openings are made in the mountain sides instead of the vertical shafts necessary in regions where the coal lies deep. Drift mining is considerably cheaper than shaft mining.

Clarksburg was the birthplace of "Stonewall" Jackson.

It is impossible to estimate the value of the logs which in the early days of settlement in this region were chopped up and burned; for as in almost all pioneer districts, forests were looked upon not as a source of wealth but as a barrier to progress and development. E.B.P.

Consult Lewis's *History and Government of West Virginia;* Willey's *An Insight into the Formation of West Virginia.*

**Related Subjects.** In the following articles in these volumes, detailed information as to the geography and life of West Virginia may be found:

| CITIES | |
|---|---|
| Bluefield | Martinsburg |
| Charleston | Morgantown |
| Clarksburg | Moundsville |
| Fairmont | Parkersburg |
| Huntington | Wheeling |
| **LEADING PRODUCTS** | |
| Coal | Petroleum |
| **MOUNTAINS** | |
| Alleghany | Cumberland |
| Blue Ridge | |
| **RIVERS** | |
| Great Kanawha | Ohio |
| Monongahela | Potomac |
| **UNCLASSIFIED** | |
| Brown, John | Harper's Ferry |

**WEST VIRGINIA,** UNIVERSITY OF, at Morgantown, a state university occupying a picturesque campus of fifty acres along the Monongahela river. It was founded in 1868 by a union of Woodburn Seminary, Monongahela Academy and West Virginia Agricultural College. The institution is organized into colleges of arts and sciences, law, medicine, engineering and mechanic arts, agriculture and veterinary science, schools of fine arts, music and military science and tactics, the commercial school and the summer school. The medical department is affiliated with the College of Physicians and Surgeons of Baltimore and with the Women's Medical College at Baltimore. The military course is based on that given at West Point. From the students of this department are chosen 225 state cadets who receive tuition and equipment free. Tuition in all departments except law and medicine is free to residents of the state, and expenses are unusually low. The library has about 58,000 volumes. There are over 110 instructors and about 1,185 students.

**WETASKIWIN,** *we tas' ki win,* a city in the central part of Alberta, forty-two miles south of Edmonton, 152 miles north of Calgary and 326 miles northwest of Saskatoon. Wetaskiwin is the junction point of the main line of the Canadian Pacific Railway and the Calgary-Edmonton branch, and is the natural shipping point for a prosperous farming center. Its grain elevators have a capacity of more than 200,000 bushels. Population in 1911, 2,411, an increase of 338 per cent over 1901; in 1916 it was 2,048.

Wetaskiwin's chief manufactures are flour, butter, tents and mattresses. Natural gas and coal are found in the vicinity, and there is also a large supply of brick clay. The city owns and operates its waterworks and electric-lighting system. The word *Wetaskiwin* means *peace hills,* and was originally applied to the hills west of the city. The town was founded about 1893 and was incorporated in 1905. The population is chiefly Canadian, but there is a considerable percentage of Scotch and Scandinavians.

**WETH'ERALD,** Agnes Ethelwyn (1857- ), a Canadian poet, novelist and journalist, also known by her pen name of Belle Thistlewaite. She was born at Rockwood, Ontario, and was educated at Friends' Schools in Ontario and in New York. Some of Miss Wetherald's poems, especially those signed Belle Thistlewaite, have appeared in *Saint Nicholas Magazine.* She has also been a frequent contributor to other periodicals, was at one time editor of the woman's department of the Toronto *Globe,* and was on the staff of the *Ladies' Home Journal. The Algonquin Maiden* is her principal work of fiction. Her poems have been published in several volumes, under these titles: *The House of the Trees; Tangled in Stars; The Radiant Road; The Last Robin.*

**WEYBURN,** *wa' burn,* a city in Southern Saskatchewan. The Souris River, which flows through Weyburn, is not navigable, but ample transportation facilities are provided by several branches of the Canadian Pacific and by one branch of the Grand Trunk Pacific Railway. Weyburn is fifty-three miles northwest of Estevan and ninety-one miles southeast of Moose Jaw. It is about 500 miles east of Lethbridge, the terminus of the Weyburn-Lethbridge branch of the Canadian Pacific, the shortest route between Winnipeg and the Pacific coast. The city was founded in 1901, and was named for the "wee burn" (small river) on which it is situated. It was incorporated in 1912, and at the same time adopted the commission form of government. Population in 1911, 2,210; in 1916, 3,054.

Weyburn's six elevators and large flour mill indicate the chief product of the farms in the vicinity. Weyburn also has soap works, an iron foundry, a sash, door and glass factory, various other industrial establishments and a large wholesale trade. It has a customhouse and Dominion lands office, and it is the center of a judicial district. The city owns all of its public utilities as well as a number of beautiful parks, among the latter being Reservoir (160 acres), City (forty acres), and Exhibition Park (twenty acres). Among the noteworthy buildings in Weyburn are a collegiate institute, built in 1912 at a cost of $85,000; a public hospital, completed in 1913 at the same cost; McKinnon's departmental store (1911, $150,000); and the Weyburn Security Bank (1911), the home office of this chartered bank. This is the only chartered bank whose home office is west of Winnipeg, and with two exceptions the only one whose home office is neither in Quebec nor Ontario.

**WEYLER,** *wa' ler,* Nicolau Valeriano, Marquis of Teneriffe (1839- ), a Spanish general whose governorship of Cuba was marked by extreme harshness and cruelty. He was born at Palma, on the island of Majorca, was educated in Granada, and rose through the military ranks until he became lieutenant-general in 1878. During the American War of Secession he was military attaché of the Spanish legation in Washington, and he accompanied General Sheridan in a number of cavalry raids. In 1868 he was ordered to Cuba, where he served for ten years under Balmaceda. He was appointed governor-general of the Canary Islands in 1879, became captain-general of the Philippines in 1889, and afterward was made provincial governor of Catalonia, Spain.

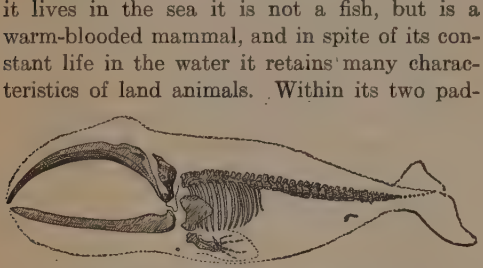
In 1896 Weyler succeeded Martinez Campos as governor of Cuba, and from the beginning he ruled with extreme cruelty. His methods aroused indignation in the United States, and in 1897 the Spanish government recalled him. For a time he was Minister of War in the Cabinets of Sagasta and Montero Rios, and later he was made captain-general of Catalonia.

**WEYMAN,** *wa' man,* Stanley John (1855- ), an English novelist, born at Ludlow, Shropshire. He was a student at Shrewsbury School and at Oxford, and was admitted to the bar in 1881. He practiced until 1890, when his first romance, *The House of the Wolf,* ap-

peared. He then devoted himself to literature and produced *A Gentleman of France,* widely read in Europe and America, *Under the Red Robe, My Lady Rotha, The Man in Black, The Castle Inn, Sophia, In King's Byways* and other works of less note. The popularity of his romances depends chiefly upon interesting plots and a light, graceful manner of narration.

**WEYMOUTH,** *wa'muth,* MASS., a town in Norfolk County, twelve miles southeast of Boston, industrially important as a center of shoe manufacture. It is on the New York, New Haven & Hartford Railroad, and on interurban lines. The town, which is made up of several villages, has three parks and Fogg and Tufts libraries. Weymouth was settled by Capt. Robert Gorges in 1623, and was called Wessagusset until 1635, when it was incorporated under its present name. The population, which was 12,859 in 1910, was 13,882 in 1916 (Federal estimate). C.P.M.

**WHALE,** the largest animal known. Though it lives in the sea it is not a fish, but is a warm-blooded mammal, and in spite of its constant life in the water it retains many characteristics of land animals. Within its two pad-



SKELETON OF A WHALE
The dotted lines indicate the general contour of the animal.

dles are all the bones and joints and most of the muscles, arteries and nerves of a human arm, and deep in its body are the rudiments of hind legs. Unlike the fish, it cannot breathe under water, though able to stay beneath the surface perhaps an hour. Its tail is horizontal, which fact enables it to rise speedily from great depths; when it reaches the surface it expels the air from its lungs through a nostril on top of its head with such force that the moisture of its warm breath, condensing in the cold air, rises in a column high in the air. The cry of the lookout—"There she blows"—is familiar to all who have read stories of whaling days. Whales are from three feet to eighty-five feet long. In most of them the head is more than a third of the length of the entire animal.

**Whale Oil and Whalebone.** The whale first known to commerce, called the *right whale,* is hunted for two products, oil and whalebone. Beneath its skin is a thick layer of fat, called *blubber,* which keeps it warm and helps it to resist the pressure of the water at great depths. Whalers cut the blubber in one continuous spiral strip like an apple paring, and reduce it to oil on board ship. Until kerosene came into use whale oil was burned in lamps all over the world.

A more valuable product is *whalebone.* This is really not bone, but plates of hair which hang from the roof of the mouth, developed from ridges like those in the human mouth. The right whale has no teeth. In feeding it travels at full speed with open jaws, and the millions of minute creatures in the water are strained out by the whalebones, numbering over 500, and some of them ten or twelve feet long. From each whale is taken a ton or more, worth about $12,000. In preparation for use whalebone is boiled and cut while soft. It is used principally in mechanical brushes for which ordinary bristles are too soft. Before flexible steel came into use whalebone was employed in making umbrella ribs and corset stays.

**Sperm Whale and Sperm Oil.** The sperm whale has teeth, and it eats cuttlefish. It has no whalebone, but its blubber furnishes sperm oil, superior to ordinary whale oil, and it yields two other valuable products, spermaceti and ambergris. The first is a wax used in candles and cosmetics, which is found dissolved in the oil in an enormous cavity in the head. The second, taken from the intestines, is extremely valuable to perfume makers.

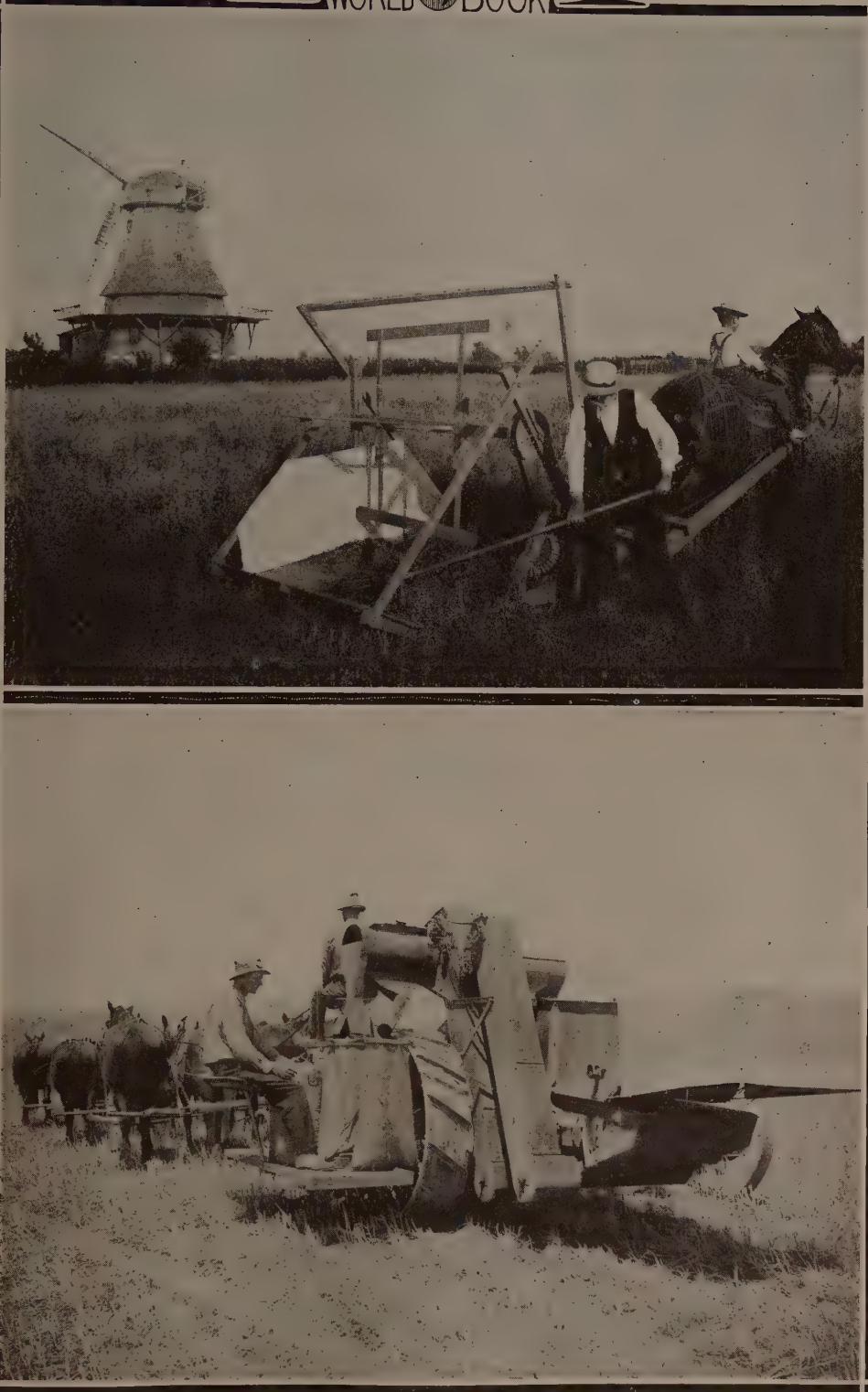
**Whaling.** We know from the accounts of Alfred the Great that whales were hunted a thousand years ago. In recent centuries, until whales had been killed in such numbers that they became scarce, hundreds of ships, most of them from America, engaged in whaling. New Bedford, Mass., was for many years the world's center for the whaling industry. Burke, in his famous speech *On Conciliation with America,* praises the exploits of Yankee whalers. In modern whaling operations swift ships are used, and the whales are killed by harpoons shot from guns. The carcasses are then towed to stations along the shore. C.H.H.

Consult Beddard's *A Book on Whales;* Verrill's *The Real Story of the Whaler.*

**Related Subjects.** Interesting correlative information will be found in the following articles in these volumes:

| | |
|---|---|
| Ambergris | Harpoon |
| Blubber | Mammals |
| Cetacea | Spermaceti |

**WHALEBONE.** See WHALE.



**YESTERDAY AND TO-DAY.** Above, the first McCormick reaper. Below, a modern machine which cuts, threshes and bags the grain.

**THE EPIC OF THE WHEAT.**

Fields of a thousand acres of golden grain are not rare in the West. This picture is from the Panhandle of Texas.

**WHAR'TON,** Edith Jones (1862- ), an American novelist, one of the three leading woman novelists of her day, the others being Selma Lagerlöf and Mrs. Humphry Ward. She was born in New York City, was privately educated and in her twenty-third year married Edward Wharton of Boston. Although before this time she had contributed stories to magazines, her ability as a writer of fiction seems not to have developed fully until 1899, when she wrote *The Greater Inclination,* a story that analyzes most keenly the motives that lead the soul toward good or evil. During the next year her second novel, *The Touchstone,* showed this quality even more plainly and disclosed her talent for brilliant, sparkling style. *The Valley of Decision, The House of Mirth, The Fruit of the Tree* and *Tales of Men and Ghosts* show her at her best, for in such stories she pictures accurately the pressure of modern social life upon the individual soul and how the resulting struggle may bring forth the purity and nobility of some characters while it crushes the aspirations of others. Later books are *The Reef, The Custom of the Country, Book of the Homeless* and *Fighting France.*

Few women novelists have excelled her in variety of methods, for she uses with skill such means of appeal as wit, sarcasm, pathos, realistic description and romantic adventures. Her style is praised for its extreme conciseness, clearness and brilliance.

During the War of the Nations she engaged in Red Cross work in France.

**WHARTON,** Francis (1820-1889), an American lawyer and writer, born in Philadelphia. He graduated at Yale University, studied law, and in 1843 was called to the bar. From 1856 to 1863 he taught English literature, law and history at Kenyon College, Gambier, Ohio, meanwhile studying theology, in 1863 receiving ordination in the Episcopal Church. For three years he served as rector in Brookline, Mass., resigning to accept the professorship of ecclesiastical and international law at Cambridge Divinity School and Boston University. From 1885 to 1888 he was counsel for the State Department at Washington, and in the latter year was made editor of the diplomatic correspondence of the United States during the Revolutionary War. He died before this work was finished. His other publications include the well-known *Treatise on the Criminal Law of the United States,* a *Treatise on the Law of Homicide in the United States* and *Law of Agency and Agents.*

**WHEAT,** the most valuable and widely distributed of the food cereals. It grows in every climate but that of the torrid lowlands and polar regions, and each climate has its peculiar variety. Although a grass closely resembling wheat is found growing wild in Southern Europe, the grain is always sown by man and has been cultivated for uncounted centuries.

Its original home is supposed to have been in Mesopotamia. It is known to have been cultivated by the aboriginal Swiss lake dwellers, and it furnished the staple food of the ancient Egyptians, Assyrians, Greeks and Romans. The relatively high value of wheat among the Hebrews is often mentioned in the Bible; in the *Book of Revelation* we read of "a measure of wheat for a penny and three measures of barley for a penny." As the choicest gift of the harvest, it was used in the sacrifices of the ancients, and it is still held sacred in parts of China.

The grain was introduced into the western hemisphere in the sixteenth century, when by accident seeds were brought with rice to Mexico from Spain.

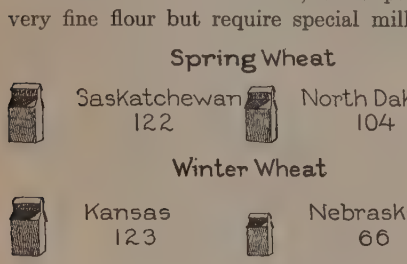
**Varieties.** Wheat is affected more by the climate than by the composition of the soil in which it grows, and the quality often varies in the same locality with different climatic conditions. It thrives best in a rich alluvial soil containing much vegetable mold, and when crops are not rotated and the soil is not rich in humus the use of fertilizers increases the yield to a considerable degree.

The lighter, clay soils produce wheat with a hard, elongated grain, known as *hard wheat,* which contains much gluten and little starch. That having a soft, plump and starchy kernel is known as *soft wheat,* and is grown in fertile,

COUNTRIES LEADING IN PRODUCTION
The yields indicated represent the average of three years' crops.

heavy soils. Both hard and soft varieties are grown extensively in the United States and Canada, but in Europe the soft wheats are generally cultivated. There, also, the *beardless,* or *bald,* varieties predominate, though the *bearded* wheats, in which the kernels are protected by long, hairlike glumes, are the more hardy. The hard wheats produce the best flour, and the soft varieties are better for starch making.

Other distinct varieties are the *spelt* wheats of the colder mountain districts, which produce a very fine flour but require special milling be-




FOUR AMERICAN LEADERS
The yields indicated represent the average of three years' crops.

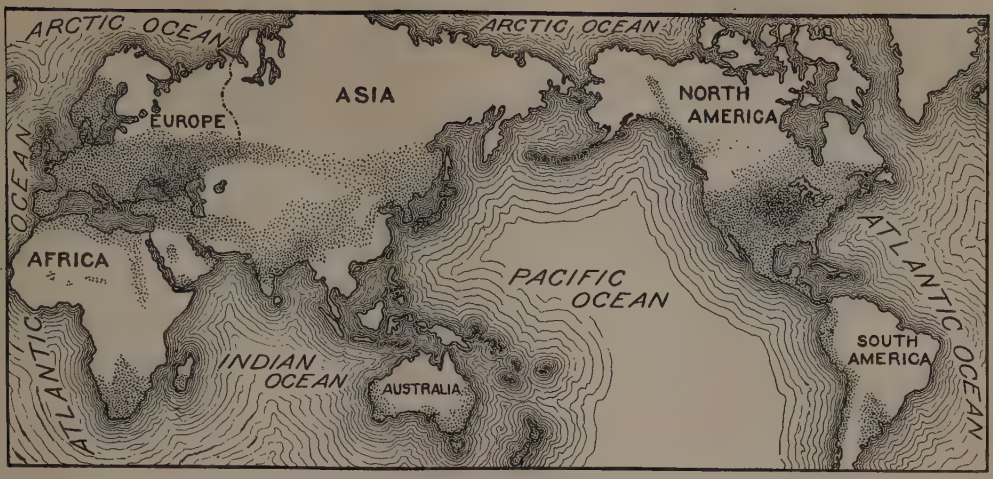
cause the chaff clings to the grain after thrashing, and the *Polish* wheat, which resembles the hard varieties of Southern Europe.

In regions where the winters are mild wheat is often sown in the fall, maturing in the following spring or summer; this is known as *winter wheat.* In the northern sections of the Great Plains of the United States, and in Canada and the plains of Eastern Russia and Siberia, *spring wheat* thrives best. This is sown in the spring and harvested the same year. Classified according to the color of the kernel, there are *light-colored,* or *white,* and *dark-colored,* or *red,* wheats.

**Methods of Cultivation.** Wheat responds quickly to careful cultivation, and the numerous varieties now raised have been obtained by selection and cross-breeding. In the Western United States and Canada the wheat farms cover thousands of acres, where, largely without irrigation, enormous quantities of the best grain are produced. All of the work is done by machinery; the land is prepared by steam and gang plows; the seed is sown in drills by seeding machines; the grain, which grows taller than a man, is cut and bound by mechanical reapers and is thrashed by machines operated by steam or electricity (see REAPING MACHINE; THRASHING MACHINE). Before the wheat is thrashed the sheaves are set up in shocks and are left to dry and cure. In Texas the wheat is harvested in April or May, while in the Northern states it is not cut until August. From the thrasher the wheat is taken to elevators, where it is stored until it slightly ferments. This "sweating," as it is called, improves the wheat for flour and increases the keeping qualities of the latter. The grading of the wheat is based upon the size and color of the kernel and the weight per bushel.

**Production and Trade.** The United States is the greatest wheat-producing country in the world in respect to number of bushels produced. Its average annual output exceeds 880,000,000 bushels, and the yield for 1916 was nearly 1,400,000,000 bushels. The leading wheat states are North Dakota, which produces both spring and winter wheat; Kansas, yielding only winter wheat; Minnesota, Nebraska, South Dakota and Washington, which produce chiefly winter wheat. The great wheat centers are Minneapolis, Chicago, Duluth and Buffalo.

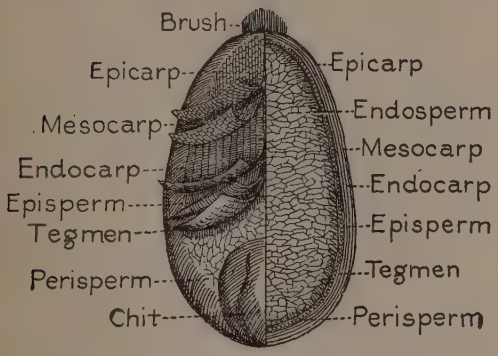
Usually less than one-fifth of the crop of the United States is exported, but during the War of the Nations the export greatly increased. In 1917, after America's entrance into the War of the Nations, the demands of the allies became still more pressing, and the food administration ordered one wheatless day a week in all hotels, restaurants and homes throughout the country that a greater quantity might be sent abroad.




GEOGRAPHIC DISTRIBUTION OF WHEAT
Where dots are most numerous the greatest quantities are raised.

Russia ranks second in the world's output, British India third, France fourth, and Canada, annually producing over 240,000,000 bushels, holds fifth place. In 1915 the Canadian yield was 376,303,600 bushels, more than one-half of which was produced by the province of Saskatchewan; most of the remainder came from Manitoba, Alberta and Ontario. Winnipeg and Port Arthur are the grain centers of the Dominion. Other leading wheat countries are Germany, France, Hungary, Spain, Italy and Argentina. In number of bushels to the acre the United States is behind most of the European countries.

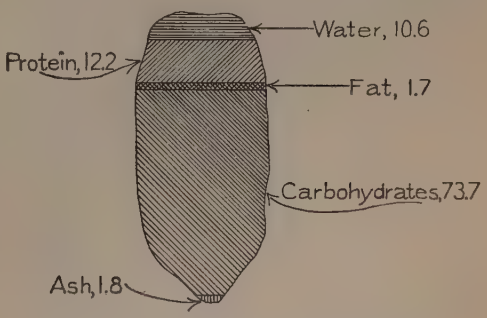
**Manufacture.** Besides its most important use in the making of flour, wheat is prepared in various other ways as food. The milling products, known as *bran, shorts* and *middlings,* are used extensively in the manufacture of breakfast foods. In some varieties the grain is finely ground and eaten raw, and in others it is rolled or flaked and cooked. It is estimated that wheat in various forms constitutes nineteen per cent of the total food of an American family.




LONGITUDINAL SECTION OF A GRAIN OF WHEAT

The use of wheat in starch dates back to ancient Egypt. Wheat starch was used in Europe during the time of Queen Elizabeth for the stiffening of neck ruffs and as a powder for the hair, and until 1848, when cornstarch was first made, it was the only starch known. It is still used for the best laundry work. Macaroni of the best quality is made from the glutinous hard wheats of the Mediterranean and Black Sea regions.

*Screenings,* which consist of inferior wheat and seeds, are used as cattle feed; wheat straw is also used for live stock, and green wheat is occasionally cut as hay.




COMPOSITION OF A GRAIN OF WHEAT
As a heat producer it averages with mutton, is nearly twice as valuable as round steak, four times as valuable as potatoes and about equal to dried peas. Its fuel value is 1625 calories per pound.

**Enemies of Wheat.** The chinch bug and the Hessian fly, both of which are described in these volumes under their respective titles, are

## *A Booklet on Wheat*

Use three sheets of paper 9 x 12 inches or larger, and fold once, making twelve pages.

Cover page—*Story of Wheat* in center; name of school and pupil's name at bottom.
Illustration: Sprays of wheat to form border design.
Inside cover—Blank.
Page three—Essay, *Where Wheat Is Grown.*
Illustration: Production map.
Page four—Essay, *The Kinds of Wheat and Their Uses.*
Illustrations: Drawings of articles made from wheat.
Page five—Essay, *Insect Enemies the Wheat Grower Must Fight.*
Illustrations: Sketch of chinch bug, Hessian fly and army worm.
Page six—Essay, *Machines Used in Reaping and Thrashing.*
Illustration: Sketch of reaper and binder.
Page seven—Bible quotations about wheat.
Illustration: A sheaf of wheat.
Page eight—My best recipes for use of wheat flour.
Illustration: Sketch of articles described.
Page nine—Essay, *Kinds of Flour.*
Illustration: Section of wheat grain, showing parts.
Page ten—Essay, *Food Value of Bread.*
Illustration: Loaves of white bread and whole wheat bread, showing constituent parts.
Inside cover—Blank.
Back cover—Other grains that may be substituted for wheat.

the most dreaded of the numerous insects which injure wheat. The *wheat midge,* another serious pest, is an orange or yellow insect about one-tenth of an inch long. Its eggs are deposited in crevices in the heads of wheat, and the larvae suck the juice from the wheat kernels, causing the grain to shrivel. The midge is best fought by deep plowing of infested fields and by burning the chaff and screenings after the crop has been harvested. Other pests include the *joint worm* and the *wheat straw worm,* both of which are controlled by burning the stubble during the fall or winter, and various species of plant lice and the army worm. E.B.P.

Consult Ten Eyck's *A Practical Discussion of the Raising, Marketing, Handling and Use of the Wheat Crop;* Dondlinger's *The Book of Wheat;* Bulletins of the United States Department of Agriculture, Nos. 534, 596, 616, 678, 680.

**Related Subjects.** The following articles in these volumes will explain references in the above discussion and will give additional information:

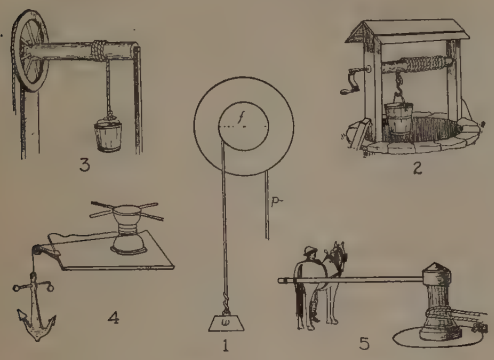
Army Worm
Bran
Chinch Bug
Dry Farming
Flour
Food
Gluten
Grains
Hessian Fly
Starch

**WHEAT'STONE,** Sir Charles (1802-1875), an English inventor and physicist, was born at Gloucester. At the age of twenty-one he was in London, engaged in making musical instruments, and early made himself familiar with the principles involved in their construction. His scientific papers, *Thomson's Annals of Philosophy, New Experiments on Sound, On Acoustic Figures* and *Experiments to Measure the Velocity of Electricity,* attracted attention, and in 1834 he was made professor of experimental physics in King's College, London.

Wheatstone's experiments were largely directed toward showing the velocity of electricity; he devised an electric telegraph, and with W. F. Cooke he secured a patent for his instrument in 1837. The Morse telegraph was operated before the one of Wheatstone and Cooke was submitted to a practical test, but the instrument of the latter was the one which formed the basis of the British electric telegraph system. Other inventions by Wheatstone are the stereoscope (which see) and the polar clock. He was among the first to recognize the value of and to apply Ohm's law in electrical measurements. In 1868 he was knighted.

**WHEEL,** an instrument of torture, formerly employed in Europe for the punishment of criminals. The victim was stretched out on a huge cart wheel, with his arms and legs along the spokes or on a frame shaped like a capital X, and his limbs were broken by repeated blows with a heavy iron bar. The body was then bent around a smaller wheel and exposed until death ensued, sometimes not until after twenty-four hours or more of terrible suffering. Occasionally some leniency was shown, and the executioner was allowed to end the victim's agony by striking a hard blow or two on the chest or stomach; in France the victim was often strangled after the second or third blow. The Greeks and Romans made use of this method of punishment, and it was in common use in Europe until the end of the eighteenth century. In fact, it was employed in Germany as recently as 1827.

**WHEEL AND AXLE,** a mechanical device consisting of a wheel or a crank immovably joined to an axle and used for raising heavy weights. The wheel and axle is one of the simple mechanical powers and is regarded as a per-




THE WHEEL AND AXLE
Explanation of the figures appears in the text.

petual lever (see LEVER), the center of the axle corresponding to the fulcrum, the radius of the axle to the weight arm and the radius of the wheel to the power arm. The law of equilibrium is as follows: *The power multiplied by the radius of the wheel equals the weight multiplied by the radius of the axle.* The formula is written thus: $P \times R = W \times r$ or $\frac{W}{P} = \frac{R}{r}$.

The most common uses of the wheel and axle are shown in the illustration. Fig. 1 illustrates the principle on which the device works. Fig. 2 is the ordinary axle and crank for raising water from a well. The hand applied to the crank is the power, and the bucket of water the weight. Fig. 3 shows a similar device with a wheel and rope in place of the crank. Fig. 4 is a capstan used in raising an anchor. The power is applied to the handspikes, which radiate from the capstan like spokes from the hub of a wheel. Fig. 5 represents the windlass often employed in moving buildings.

In the derrick a double wheel and axle is generally used. The effort of the workmen is applied to cranks which are attached to an axle with a small gear that meshes into the cogs of a large wheel on another axle.

**WHEEL'ER,** BENJAMIN IDE (1854- ), an American educator and university president, born at Randolph, Mass., and educated at Brown University and the University of Heidelberg. From 1879 to 1881 he was instructor in Greek at Brown University, and in 1885-1886 instructor in German at Harvard; in 1887 he removed to Cornell University, where he was professor of Greek and comparative philology for the ensuing twelve years. In 1899 he was elected president of the University of California.

Meanwhile, from 1895 to 1896, he had served as professor of Greek literature in the American School of Classical Studies at Athens, and in 1898 as lecturer in the Harvard Divinity School. In 1909-1910 he was Roosevelt professor at the University of Berlin. He has written much on philological and educational topics, and among other works has published *Analogy in Language, Introduction to the History of Language, Organization of Higher Education in the United States* and a *Life of Alexander the Great.*

**WHEELER,** JOSEPH (1836-1906), an American soldier who fought with distinction on the Confederate side in the War of Secession, and was also prominent in the Spanish-American War. He was born in Augusta, Ga. After graduating from the United States Military Academy in 1859, he served against the Indians in Kansas and New Mexico, resigning in 1861 to become a lieutenant of artillery in the Confederate service. He distinguished himself at Shiloh and became head of the cavalry of Bragg's army, which he led in almost every advance. He was advanced to the rank of major-general in 1863, was Rosecrans' most formidable opponent, and impeded, although he could not stop, Sherman's march to the sea. At the end of the war General Wheeler practiced law until he was sent to Congress as Representative. In the Spanish-American War he was commissioned major-general of volunteers, and he commanded the American forces at the Battle of Las Guasimas. He was stationed at Long Island and in the Philippines after the war, retiring in 1900. In 1899 he wrote *The Santiago Campaign.*

**WHEELER,** WILLIAM ALMON (1819-1887), an American Congressman and a Vice-President of the United States. He was born in Malone, N. Y., studied at the University of Vermont, and began the study of law in his native town. In 1845 he was admitted to the bar, but in 1851 abandoned his law practice, owing to a throat affection, and engaged in banking. For twelve years he was manager of the Northern New York Railroad. He was a member of the state legislature for two terms, and in 1860 was elected to Congress as a Republican. During his Congressional term Wheeler was chairman of important commit-

tees, and was the author of a bill on the adjustment of the political disturbances in Louisiana. In 1876 he was nominated for the Vice-Presidency of the United States, and was elected with Hayes. At the expiration of his term in 1881 he returned to Malone and did not again enter public life.

**WHEELING,** W. Va., the county seat of Ohio County and the metropolis of the state in 1910, with a population of 41,641. In 1916 a Federal estimate reduced Wheeling to the position of the second city, Huntington's growth having been more rapid. It is situated on the east bank of the Ohio River at the mouth of Wheeling Creek, and is built on a narrow strip of land between the river and hills to the east. It is sixty-six miles northeast of Pittsburgh, and is served by the Baltimore & Ohio and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads. Wheeling Island, on which a part of the city is built, is connected with the mainland by bridges, one a suspension bridge more than 1,000 feet long. Several bridges span the river to towns on the Ohio shore.

The city has the Linsly Institute, for boys, and Mount de Chantal School for Girls. One of the most interesting features is the Market Auditorium, built in 1912 at a cost of $160,000. It occupies a city square in the business district. Other noteworthy features are Wheeling and Riverside parks, a Federal building, county courthouse, city hall, public library, the Henry Clay and other monuments, and the site of Old Fort Henry. The city has four large public hospitals. Industry here centers in the manufacture of iron and steel. Coal mining and the manufacture of glass, enameled ware, nails, tinplate, pottery and cigars are important industries, and there is a prosperous wholesale jobbing trade. The surrounding section produces large quantities of apples.

Colonel Ebenezer Zane and his two brothers founded Wheeling, the first town on the Ohio River, in 1769. In 1774 Fort Henry, named in honor of Patrick Henry, was built on a hill within the present city limits. It was strongly but unsuccessfully attacked by Indians the year it was built and also in 1781, and again by British and Indian in 1782. The town was incorporated in 1806 and became a city in 1836. In 1861 it was the meeting place of a convention of Virginians who opposed secession, and the constitutional convention of West Virginia met here in 1861-1862. Wheeling was the state capital from 1863 to 1870, and again from 1875 to 1885. The commission form of government became effective in 1917. The waterworks, electric-light plant and a crematory are owned and operated by the municipality. Twice Wheeling has suffered from great floods, once in 1884 and again in 1913. C.M.K.

**WHIG,** the name assumed by two great political parties, one in Great Britain, the other in the United States. One theory declares that the word is derived from the initial letters of the Scotch Covenanters' motto, "We hope in God;" another derives it from *whiggamore,* a nickname for the Presbyterian peasants in the west of Scotland, probably from *whig,* meaning *to jog along.* Whatever the origin there is no doubt that it was a term of reproach. In 1679 the name was first used in a political sense by the adherents of Charles II to compare their parliamentary opponents to the Presbyterian rebels in Scotland.

**Party's History in Great Britain.** At first used as a nickname, it was soon adopted as the official name of the party. The Whigs, during the eighteenth century, established a firm parliamentary government, which could check or even set aside the power of the Crown. They were, on the whole, the great landowners and the merchants and tradespeople of the towns, while the Tories were mostly the clergy and the smaller landowners. When George III came to the throne the government of England was practically in the hands of a few great Whig lords, who controlled Parliament not infrequently by corrupt methods.

The king, however, gained ascendancy; about 1770 the Whigs lost their power, and under the two Pitts the Tories became the forward-looking party, relying for its power on the Crown and the people, as opposed to the great Whig families. The French Revolution, however, with its doctrines of democracy, was too much of a shock for the Whig landowners, and most of them soon allied themselves with the Tories, who then became identified, as a body, with the desire to retain the existing order of things. The Whigs, on the other hand, became the advocates of the new democracy of progress and of reform. The Reform Bill of 1832 was the result of their efforts, and with its passage the Whig party practically came to an end. In its place arose the Liberals, but to this day the term Whig is sometimes applied to the conservatively inclined Liberals as a term of reproach.

**In the United States.** As the name Whig was used in England by those who opposed the usurpation of power by the king, so in the

American colonies the name was first adopted by those who opposed the efforts of the Crown to annul their political and commercial privileges. It is believed to have been first used in New York in 1768, and before the Revolution broke out was practically synonymous with *patriot*—one who was in favor of declaring independence—while the term *Tory* was applied to a Loyalist.

After the Revolution new issues were a basis for new party names, and the terms Whig and Tory disappeared for several decades. In 1834 the term Whig was first mentioned as a suitable name for the party which was opposing Jackson, the "usurper of executive power." Besides the Clay-Webster-Adams Republicans, the new party drew much of its strength from factions which Jackson's high-handed proceedings had offended, notably the defenders of states' rights and the Anti-Masons. From the first it was composed of elements which had little or nothing in common, and after twenty years, when the questions of slavery and secession could no longer be compromised, these elements, by their own weight, separated again.

The party was not sufficiently organized in 1836 to hold a national convention, but William Henry Harrison, who had been nominated by several local conventions, was a candidate on his personal popularity. Webster and two other Whigs were also candidates, but the combined vote of the four did not equal that for Martin Van Buren. In 1840, again with no platform, Harrison was successful in one of the most picturesque campaigns in the history of the United States, with its slogan of "Tippecanoe and Tyler, too." Harrison's early death was a blow to the Whigs, for Tyler turned out to be more of a Democrat and his opposition weakened the party.

In 1844 the Whigs nominated their real leader, Henry Clay, and for the first time adopted a platform which contained an enunciation of principles—protective tariff, well-regulated national currency, a single term for the President, and the construction of internal improvements with money received from the sale of public lands. Clay's refusal to take sides on the Texas question, though it saved him many Southern votes, cost him the votes of the Northern antislavery Whigs. This disagreement on principles led to the nomination of Zachary Taylor in 1848, a successful attempt to conceal issues under the personal popularity of the candidate. In 1852, however, the nomination of General Winfield Scott, another soldier hero, was of no avail, and Franklin Pierce was overwhelmingly elected. The Kansas-Nebraska Bill of 1854 broke up the Whig party, most of the Northern Whigs joining the new Republican party, the Southern returning to the Democratic party. In 1856 a Whig convention endorsed Fillmore, the Know-Nothing candidate for the Presidency, and in 1860 the remnants of the Whigs were included in the Constitutional Union party. This, however, was the last stand, and thereafter all traces of the Whig party are lost. W.F.Z.

Consult McK. Ormsby's *History of the Whig Party;* McKee's *National Conventions and Platforms of All Parties.*

**Related Subjects.** The following articles in these volumes will make clear the references in the above discussion:

Constitutional Union Party
Know-Nothings
Liberal Party
Political Parties, subhead *History of Political Parties in the United States*
Republican Party
Tory
United Empire Loyalists

**WHIPPLE,** Henry Benjamin (1822-1901), an American bishop of the Protestant Episcopal Church, notable for his services, educational and religious, among the American Indians of the Northwest. So thoroughly did they accept him and believe in him that they gave him the name of "Straight Tongue," than which there are few higher compliments. He was born in Adams, N. Y., was compelled to give up his idea of a college education on account of ill health, and went into business. In 1847, having received private instruction in theological studies, he was ordained to the ministry and became rector of Zion Church, in Rome, N. Y. Removing in 1857 to Chicago, he was for two years rector of the Church of the Holy Communion, and at the end of that time was consecrated bishop of Minnesota.

Bishop Whipple was thrown into relations with the Indians, and his labors for them were unceasing; he established several missions which did much toward their civilization. His knowledge of Indian character and motives was widely recognized, and he was more than once of assistance to the government in its dealings with the red men. In Whipple for the second time in the history of the United States the country had an "apostle to the Indians," John Eliot having earned that distinction 200 years earlier. His autobiography, *Lights and Shadows of a Long Episcopate,* is a work of great interest, and it gives much valuable information about the Indians.

**WHIP-POOR-WILL,** a North American bird of the goatsucker family, with wide, bristly mouth, soft plumage and silent flight. It received its name because of its weird, whistling cry, "whip-poor-will, whip-poor-will." It is a

Where deep and misty shadows float
In forest's depths is heard thy note.
Like a lost spirit, earthbound still,
Art thou, mysterious whip-poor-will.
—LeBaron: *The Whip-Poor-Will.*

night bird, haunting thick woods and devouring great numbers of the large-bodied moths, but never appearing in the open and about cities as does its near relative, the nighthawk. It rests by day, on the ground or perched lengthwise on the limb of a tree, its mottled feathers making it hard to discover. The whip-poor-will breeds from the Gulf states northward to Manitoba and New Brunswick, wintering in Florida and southward. It makes no nest, but lays its eggs among the leaves on the ground, or in hollows in rocks or stumps. They are two in number and dull white in color, delicately and obscurely marked with lilac and brown. If her young are disturbed, the mother carries them away in her mouth, as a cat does a kitten. See NIGHTHAWK.

**WHIRL'POOL,** an eddy or vortex of water. A spinning motion is imparted to water by the striking of the current against a bank of peculiar formation, by the meeting of two currents or by the action of the wind. The famous whirlpool in the gorge below the falls of the Niagara River was caused by the wearing away of a side basin out of the line of the river's course. Rocks and opposing tides form whirlpools in the ocean. The Maelstrom, off the coast of Norway, and the Charybdis, between Sicily and Italy, are formed by tidal currents (see SCYLLA). In calm weather they are not dangerous to ships, but their violence is much increased by storms.

**WHIRL'WIND,** a circular or spiral movement in the air caused by the sudden rising of an overheated layer of surface air into the heavy, cooler atmosphere above. These winds occur most frequently in the deserts, where the sun beats down on the dry sand all day long, heating the air near the ground to a very high temperature. The motion of the air as it rises can be seen, because it often carries sand and dust more than 1,000 feet above the earth. It has been estimated that, during four days of such winds in March, 1901, nearly 2,000,000 tons of dust from the Sahara fell on Central Europe, the greater part reaching the ground south of the Alps. In the oceans of the tropics, the air above the water may become heated in much the same way, and when it rises *waterspouts* (which see) are formed. The term *whirlwind* is sometimes applied also to such cyclonic storms as tornadoes, typhoons and hurricanes. See CYCLONE.

**WHISKY,** *whis'ki,* an intoxicating liquor distilled from malt, grains or potatoes. The whisky produced by the Scotch and the Irish is malt whisky, and it is made chiefly from malted barley. In the United States, whisky is usually made from various grains, chiefly corn and rye, to which a small proportion of malt is added. The manufacture of this liquor was forbidden by law September 1, 1917, for the period of the War of the Nations.

In the process of manufacture corn, rye, wheat or potatoes are boiled until a mash is formed; malt is then added to convert the starch into sugar. Yeast is added to produce fermentation, and the process is continued until the sugar has been converted into alcohol. The alcohol is then separated by distillation (which see). The chief kinds of grain whisky are *Bourbon* and *rye.* The principal ingredient in rye whisky is rye, as the name indicates; Bourbon whisky is made of corn. Grain whiskies can be produced more cheaply than malt whiskies, but they are stronger and less palatable, unless thoroughly ripened. Whisky is occasionally made from such other substances as sugar and molasses.

**WHISKY INSURRECTION,** *in sur ek'shun,* an uprising in Western Pennsylvania in 1794, growing out of an excise tax levied by act of Congress. The settlers of the region were largely engaged in making whisky, which, for lack of transportation facilities, could be shipped to market more easily than the bulky grain; the tax was a heavy burden, as the people were chiefly dependent on whisky manufacture for their support. They exhibited a strong feeling of ill will towards the revenue collectors, and resisted all efforts to collect the tax. The rioters were so numerous that on September

25, 1794, President Washington ordered 15,000 militia sent to Pittsburgh, under "Light-Horse Harry" Lee, who was at that time governor of Virginia. The insurrection was quelled without difficulty. Several hundred prisoners were taken, two of whom were convicted of treason. Later they were pardoned by Washington.

**WHISKY RING,** an association, composed chiefly of whisky manufacturers and internal revenue officers, which had as its object the enrichment of its members at the expense of the national government. First formed in Saint Louis, it spread to many of the large cities of the country, and came to exercise a decided influence in national politics. Means were found to compel almost every distiller to contribute to the funds of the "ring," and this was then distributed among the officials according to a regular schedule. Some of these were high in the government service, the chief clerk in the Treasury Department and O. E. Babcock, President Grant's private secretary, being implicated.

The Treasury Department could not long remain blind to the fact that the revenues from distilled liquors were falling off to the extent of millions of dollars. Many attempts were made to locate the leakage, but without success, for the thieves were promptly notified by their confederates in the Treasury Department. Finally, after the frauds had gone on for years, Benjamin H. Bristow, Secretary of the Treasury, succeeded in 1875 in collecting sufficient evidence to proceed against the lawbreakers, and several hundred indictments resulted. Most of the guilty persons were convicted, but the leaders were nearly all pardoned before they had served out their terms. Babcock was acquitted because of lack of evidence. The President did not escape censure by reason of the affair, because it seemed that he had not supported Bristow in his efforts to punish the evildoers and had allowed himself to be unduly influenced by those who had not the best interests of the administration at heart.

**WHIST,** a game of cards played with a full pack of fifty-two cards, four persons generally playing, two against two. The cards are shuffled and cut, and the dealer gives to each player thirteen cards one at a time, beginning with the player on his left and ending with himself. The last card is turned up for trumps, giving a particular value to whatever suit it may be. The cards rank from the ace down, king, queen and jack coming next, the other cards bearing the value of the pips, or spots. The player next to the dealer, on the left, commences the game by leading or playing a card face up on the table, the other players following in order from left to right. The four cards played constitute a trick.

The object of the game is to take as many of the tricks as possible. Players must follow suit when they can do so. Having no card of the suit led, a player may discard a card of another suit, which gives him no chance to win the trick, or he may take it by playing a trump, a trump being beaten only by a higher trump. When all four have played, the winner, the player of the highest card, leads another card from his own hand for the next trick; the winner of the next trick does the same, and so on till thirteen tricks have been played. Each side counts one for every trick taken, above the number of six.

The ace, king, queen and jack are called *honors,* and the side that holds three of these cards scores 2; if holding 4 honors they score 4 points. If each side holds 2 honors they are said to be "divided," and neither side scores honors. In *long whist* a game is 10 points; in *short whist* 5 points. It is only in long whist that honors are counted.

**Progressive Whist,** a popular game played with the same number of cards and players as ordinary whist. Any number of tables may be arranged, four sitting at each. Play starts at a given signal and stops at a certain time limit, also by signal. The two that have taken the most tricks at each table when the signal is given move up to the next table; no two hands are played against the same opponents or with the same partner. The game continues in this way for the time agreed upon. Each player has the number of tricks won marked on a card. The winner of the greatest number of tricks receives a prize, and a "consolation" prize is given to the winner of the lowest number of tricks. F.ST.A.

Consult Cavendish's *Principles of Whist, Stated and Explained;* Foster's *Complete Hoyle.*

**WHISTLER,** *hwis'ler,* JAMES ABBOTT MCNEILL (1834-1903), America's most original artist, and an interesting personality in the art of the nineteenth century. He gained distinction in many fields—etching, pastel, oil painting and water color—and he was unquestionably one of the world's greatest masters of color values. His philosophy of art was essentially modern, and to a certain extent his work represents the culmination of modern theories, yet he was always intensely individual. Though he

claimed to be a realist, he believed that it was the artist's privilege to select only those elements of beauty which, harmoniously arranged, make the picture, just as the musician at the piano selects only certain notes and combines these to produce beautiful harmonies. Whistler's disregard of accuracy of detail is thus explained, and so, too, is explained his ability to make a scene of poverty and squalor a thing of beauty.

J. A. McN. WHISTLER

He was born at Lowell, Mass., of parents who enjoyed high social position. His father, Major George Washington Whistler, was an engineer in the United States army. When James was nine years old the family removed to Russia, where the major supervised the building of a railroad for the czar. During this interval the boy attended the Imperial Art Academy of Saint Petersburg (Petrograd). After his return to America he studied at West Point Military Academy, but his tastes were so averse to things military that he was dismissed before completing the course. He began the serious study of art in 1856, in Paris, and in 1859 removed to London. From that time on he lived principally in the English metropolis, though he made several trips abroad.

Whistler early won favorable notice as an etcher. His first important views, *Little French Series* (1858), were greatly admired, and his reputation was further enhanced by a series illustrating scenes along the Thames, begun after his removal to London. These and various other series, especially a group of Venetian illustrations, give him a place with Rembrandt among the greatest etchers. Probably the best known of his portraits in oil is the picture of his own mother (Luxembourg Gallery, Paris)—a charming study in gray and black. An idealized portrait of Carlyle may be seen in the Glasgow Museum. His landscape and marine views include *Thames in Ice* (National Gallery, Washington, D. C.), *Chelsea Snow, Southampton Water* (Art Institute, Chicago), *The Ocean* (Frick collection) and *Valparaiso Harbor* (National Gallery).

The loveliness of Italy's wonder city, Venice, made an especial appeal to him, and its beauty he portrayed in etching, oil painting and pastels. He also exercised wide influence on interior decorating, and his decorations for the famous Peacock Room of his art patron, Frederick Leyland (formerly in London, now in the National Gallery, Washington), represent the best in that field.

So individual a personality as Whistler could hardly escape criticism, and he received it in good measure. He himself was caustic of tongue and fiercely intolerant when the opinions of others conflicted with his own, and he used voice and pen unsparingly to overwhelm his critics. Ruskin's expressed contempt for one of Whistler's so-called "Nocturnes"—for he styled his pictures symphonies, nocturnes, arrangements, etc.—brought on a suit for libel, in which Whistler won damages of one farthing. Thereafter the coin was proudly worn by him as a watch charm. His forceful style is well illustrated in his *Ten O'Clock, The Gentle Art of Making Enemies* and the *Baronet and the Butterfly*. A very fine collection of Whistler's works may be seen in the National Gallery at Washington, and there are many examples privately owned. R.D.M.

Consult the authorized biography, Pennell's *Life of James McNeill Whistler;* Hartmann's *The Whistler Book.*

**WHITBY,** one of the lake ports of Ontario, with a good harbor. It is located thirty miles northeast of Toronto and about forty miles west of Port Hope. The Grand Trunk and the Canadian Pacific railroads parallel the shore of Lake Ontario, and pass through the town. At Whitby is the Ontario Ladies' College. Population, 1911, 2,248; in 1917, estimated 2,325.

**WHITE,** the color seen in pure snow. According to the theory of color, white is composed of all the colors in the spectrum, but in practice this does not hold true. We cannot make a white pigment by mixing in their proper proportions the pigments corresponding to the colors of the spectrum, because of the impurities they contain. Theoretically a white object reflects all the colors, and a black object absorbs all colors; that is, white is the presence of all color and black the absence of all color (see Color). Of the many white paints on the market, that made from white lead is the most widely used. In painting, white is extensively employed to produce light tints of the different colors.

In legend and tradition white is the emblem of purity. In war a white flag is used when a parley is desired, and is called a *flag of truce;* it means "stop firing." A white flag is also raised over a fortress or on a ship as the symbol of surrender.

**WHITE,** Andrew Dickson (1832- ), an American diplomatist and educator, born at Homer, N. Y. He studied at Yale University and in Paris and Berlin, and in 1854 was appointed an attaché of the American legation at Saint Petersburg (Petrograd). Returning to the United States in 1857, he became professor of history and English literature at the University of Michigan, but resigned that position six years later to enter the New York Senate. He did much to encourage Ezra Cornell in his ambition, and can be called, with him, one of the founders of Cornell University. In 1867 White became its first president. The credit for the successful organization of the institution belongs in large measure to him, and he donated to it about $100,000 and his splendid historical library of over 40,000 volumes. He resigned the presidency and the professorship of history in 1885.

Meanwhile, he had taken an active part in public affairs. In 1871 he had been United States commissioner to Santo Domingo, in 1879 had gone to Germany as the American minister, and from 1892 to 1894 he served as minister to Russia. President Cleveland appointed him, in 1896, a member of the commission to investigate the Venezuelan boundary question, and in 1897 he was sent to Germany as ambassador, the post having risen in rank and dignity since his first German appointment. That position he held until 1902, longer than any previous American representative, meanwhile serving, in 1899, as chairman of the American delegation to the Hague Peace Conference. Many honors were conferred upon him at home and abroad, and he was a member of a number of scientific societies. Doctor White has written much; his published works include *Outlines of Lectures on History, Battlefields of Science, The New Germany, Democracy and Education, Paper Money Inflation in France* and an *Autobiography.*

**WHITE,** Edward Douglass (1845- ), an American jurist, Chief Justice of the Supreme Court of the United States, succeeding Melville W. Fuller, of Illinois. He was born in the parish of Lafourche, La., and was educated in Catholic schools, including Georgetown University. His education was interrupted by the outbreak of the War of Secession, throughout which he served in the Confederate army. He was admitted to the bar in 1868, became a member of the senate of Louisiana in 1874, and in 1878 was made associate justice of the state supreme court. In 1891 he was elected to the United States Senate as a Democrat, serving until 1894, when he was appointed by President Cleveland Associate Justice of the Federal Supreme Court. President Taft advanced him to the position of Chief Justice in December, 1910. The chief cases over which Justice White has presided are the income tax cases and the Northern Securities case, and in these, as in others, he has won credit for the carefulness and the independence of his opinions.

**WHITE,** Gilbert (1720-1793), an English naturalist, famous as the author of the *Natural History of Selborne,* which since its publication in 1789 has retained its popularity. This history is an account of White's close observation and intimate association with nature during his quiet, scholarly life in the beautiful rural town of Selborne, in Hampshire, where he was born.

White was educated at Oriel College, Oxford, of which he was elected a fellow and later dean. After serving as curate in a neighboring village, he accepted the parish in his native town, which he held until his death. Besides his devotion to nature, White was an enthusiastic student of antiquity, and has left many interesting letters on the ancient life of Selborne.

**WHITE,** Richard Grant (1821-1885), an American Shakespearean scholar and critic, was born in New York. He studied law, but abandoned his legal career after a short time to devote himself to literature. He acquired fame as one of the most celebrated Shakespearean scholars; his *Riverside Edition of Shakespeare* achieved great popularity. White's other works include *Studies in Shakespeare, England Without and Within, Words and Their Uses* and *Everyday English.*

The following is from a poem written by Paul Hamilton Hayne in memory of White, after the latter's death:

Well were his nature and his toils allied,
Large both and liberal!—'tis no marvel then,
He walked in such security of ease
Through Shakespeare's world of monarchs and great men,
A kingly realm he loved and magnified.

**WHITE,** Stewart Edward (1873- ), an American writer, the author of many novels having as their background the life in the lum-

ber camps of Northern Michigan. He was born at Grand Rapids, Mich. His father was one of the men who laid the foundations of the lumber industry which for many years absorbed the best energies of that state, and when not at school the nature-loving son was constantly in the woods enjoying life among the rivermen. He did not start to school until sixteen years of age, and then he made his grades in leaps and bounds, completing his education with highest honors. He is a graduate of the University of Michigan, and studied law at Columbia University. White is a great student of outdoor life. He has made a special study of birds and has written many magazine articles about them. Of his many novels, the following are the best known: *Blazed Trail Stories, Conjurer's House, The Riverman, Arizona Nights, Camp and Trail, The Gray Dawn* and *The Rediscovered Country.*

STEWART EDWARD WHITE

**WHITE,** William Allen (1868- ), an American editor and story writer, known throughout the Middle West as one of the most original and progressive journalists and writers of his day. A vigorous editorial entitled "What's the Matter with Kansas?" brought him widely into public notice in 1896, and is still cited as an example of incisive and timely criticism. It was written for the Emporia (Kan.) *Gazette*, a newspaper of which he became owner and editor in 1895. This journal, under his management, has been for years one of the most influential in the state. White was born in Emporia, and was educated at Emporia College and the University of Kansas. In addition to his journalistic writings he has produced a number of stories and sketches which portray, in a humorous and sympathetic way, life in the typical Middle West town. His works include *The Court of Boyville, Stratagems and Spoils, In Our Town, A Certain Rich Man, God's Puppets* and *The Old Order Changeth.*

WILLIAM ALLEN WHITE

**WHITE,** Sir William Thomas (1866- ), one of Canada's leading financial experts and a member of the Borden Ministry. He is a native of Ontario, having been born at Bronte; was educated at Toronto University, graduating in 1895, and was admitted to the practice of law in Toronto in 1899. He preferred not to practice his profession, but became a newspaper man and later a city employee in the assessment department. In the latter position he developed unusual financial ability, and in 1910 had risen to the presidency of the National Trust Company, a Toronto bank.

When the reciprocity measure was pending between the United States and Canada in 1911 he opposed it with such success that defeat of the measure and the Ministry followed. His ability was by that time so widely recognized that in 1911 Premier Borden took him into his Cabinet as Minister of Finance. In 1915 he was knighted by King George V.

**WHITE ANT.** See Termites.

**WHITECAPS,** the usual name applied to so-called vigilance committees in the United States, confined largely to Indiana and the Southern states, whose object was to remove objectionable characters from a community. The term was derived from the nature of the disguise employed—a white foolscap drawn over the head, with usually coarse sacking covering the upper part of the body. The whitecaps issued forth under cover of darkness and warned intended victims to leave the neighborhood; if a warning was not heeded, more drastic measures were employed. Destruction of property often followed, and occasionally human life was sacrificed. Not always were the objects of whitecap wrath guilty of any offense, but were merely the unfortunate victims of prejudice or suspicion. About the year 1890 their power was broken by the state authorities.

**WHITE'FIELD,** George (1714-1770), an English religious leader, the founder of the Calvinistic Methodists, and leader with John and Charles Wesley in the early preaching which led to the organization of the Methodist Church. He was born in Gloucester, and in 1732 entered Pembroke College, Oxford. While at the university he came under the influence of the Wesleys, and was an active member of

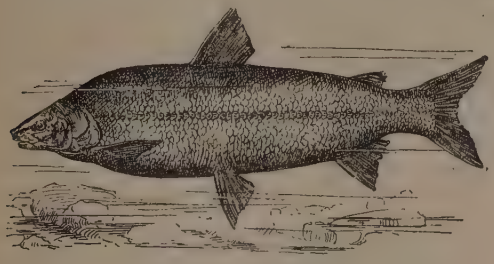
Charles Wesley's derisively-named "Holy Club." Ordained to the ministry in 1736, he became known at once as a preacher of unusual power. In 1738 he went to Georgia, in the American colonies, to join John Wesley in his mission work there, but returned home in the same year to collect funds for an orphanage which he had planned for the colony.

The churches were closed against him because of his Wesleyan tendencies, and he began preaching in the open air. Whitefield's success was remarkable, and was repeated on his second visit to America, in 1739, when he preached at various places on his journey from New York to Georgia. He returned to England in 1741, but in the meantime his doctrinal views had brought about his separation not only from the Episcopal Church but from Wesley as well, for Whitefield held firmly to Calvinistic theories, which Wesley denied. In 1743, therefore, he founded the Calvinistic Methodist Society.

In his later life Whitefield visited America several times, and both there and in Great Britain continued his effective preaching. It is said that during his life he preached over 17,500 sermons; many of these have been published, but they are not especially striking, as read, Whitefield's gift having been in forceful delivery. Unlike Wesley, he had not the faculty of organization, and many of his followers joined the Wesleyan Methodists after his death. Whitefield died in Newburyport, Mass., on his seventh visit to America. A.MC C.

Consult Tyerman's *Life of Whitefield,* his most complete biography. It is an English publication, no American having written of his life.

**WHITE'FISH,** a group of fresh-water fish of the salmon family, inhabiting lakes and streams in the northern regions of North America, Europe and Asia. The whitefishes



THE WHITEFISH

are among the world's most important fresh-water food fish, and among the various species the *common whitefish* of North America takes a leading place in numbers and commercial value. About 30,000,000 are caught each year in the Great Lakes region in Canada and the United States, and the total value of the catch is approximately $1,500,000. Because great numbers of the millions of eggs deposited by the fish are eaten by the yellow perch, crawfish, wild fowl and other creatures, the United States Fish Commission carries on a systematic method of artificial propagation of whitefish. Fishing is done principally with gill nets, but trap nets, pound nets and seines are also used.

The common whitefish has an elongated, compressed body, a cone-shaped snout which projects beyond the lower jaw, a small, toothless mouth and a forked tail. The color is bluish-olive above and silvery below and on the sides. Average specimens weigh four pounds, and the largest are rarely over twenty pounds in weight. The fish feed on insects, larvae and shellfish, and, except at spawning time, they inhabit the deeper parts of the water.

Another excellent food fish of American waters is the *Rocky Mountain* whitefish, found in numerous mountain streams and well known to Western anglers. In the Arctic regions is found the *muksun,* a very large species, and in Alaskan waters, the *humpback.* The *sault* is an excellent species inhabiting the lakes and streams from Lake Winnipeg to Labrador and southward to the Adirondack and White mountains. *Coulter's* whitefish is a small species discovered in 1892 in the Kicking Horse River in British Columbia.

Consult Jordan and Evermann's *Fishes of North and Middle America.*

**WHITE HORSE,** a town in the south-central part of Yukon Territory, about fifty miles north of the British Columbia boundary. It is at the head of navigation on Fifty-Mile, or Lewes, River, a tributary of the Yukon, and it is also the northern terminus of the White Pass & Yukon Railway, which runs northward from Skagway, Alaska, a distance of 110 miles. Though it is a copper-mining camp of considerable size, White Horse is most important as a transfer point for passengers and freight to and from the Klondike region. It is also an outfitting point for the Sushana gold fields. Population in 1916, about 750.

**WHITE HOUSE,** or EXECUTIVE MANSION, the official home of the President of the United States, in Washington, D. C. It is on Pennsylvania Avenue, between the Treasury building and the State, War and Navy building, and is a two-story structure of freestone, painted white. In style it is colonial, and the north

front has an Ionic portico. The first White House was begun in 1792, and was taken possession of by John Adams in 1800. In 1814 it was largely destroyed by the British, and four years later the present one was built. There have been alterations and additions since that time, the chief one consisting of the erection of wings containing the business offices of the President and his secretaries.

The main part of the White House is 170 feet by 86 feet. The lower floor is given up largely to reception halls, including the famous East Room, 80 by 40 feet, in which public receptions are held; the Blue Room, in which diplomats are received; the Red Room, used chiefly by the ladies of the household for social affairs and for the reception of callers; and the Green Room, with its interesting portraits of the Presidents. In addition, there are on this floor the state dining room and the conservatory. On the second floor are the private apartments of the President and his family.

The White House is surrounded with a park made attractive by rolling lawns, beautiful trees and plants and fine walks. During the summer months a Marine Band furnishes music there at stated times. It is not an easy matter for a stranger to gain access to the President. No one is admitted at the main entrance except those known personally to the family; those desiring to see the President on business must go to the offices in the wing, where they are met and interviewed by the President's secretaries.

See panel headings of articles relating to the Presidents of the United States for illustrations of the White House at different periods in the country's history. Consult Singleton's *Story of The White House.*

**WHITE LEAD,** a compound of lead and carbon dioxide, extensively used in the manufacture of white paint. It is prepared by several processes, the most recent being one in which electricity is employed. A lead plate is attached to the anode (positive) pole, and a copper plate to the cathode (negative) pole, and both are placed in a solution of sodium nitrate (saltpeter). The current sets free the nitric acid in the solution, and this attacks the lead, forming lead nitrate. The sodium is set free and decomposes the water. The hydrogen thus set free unites with the lead and forms a compound which is changed to white lead, when treated with sodium bicarbonate.

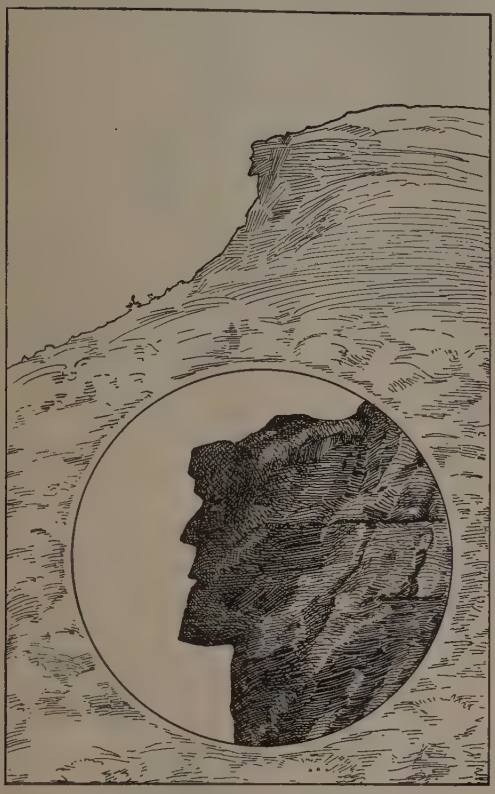
The oldest, or Dutch, process consists in placing coils of sheet lead in earthen pots which contain a weak solution of acetic acid. The pots are then buried in spent tan bark in a chamber where steam and air act upon the substances. In the course of two or three months all the lead is changed to white lead, which is in the form of powder. This is then ground in linseed oil to form the white paint of commerce. White lead forms a durable paint, and is used as the body of many colored paints, as well as for white paint. When exposed to gases containing sulphur it turns black. See PAINT.

**WHITE MOUNTAINS,** "the top of New England," a comparatively short range in the Appalachian system, extending from Southern Maine into New Hampshire in a southwesterly direction. Towering above verdant hills are precipitous, rocky peaks, which, reflecting the sun on their bare surfaces, have the appearance of snow-capped summits and have given the range its name, the "Marvelous Crystal Hills," or the "White Mountains." The irregular, rocky domes rise from a plateau about 1,600 feet above the sea. This hilly table-land is deeply scarred with the notches made by swift streams as they have cut their way to the ocean, descending the hills in a series of cataracts. The meadowed alpine parks are crossed by many brooks, trickling over stony beds to join the busy torrents, or pausing in some shady dell in a deep pool to lure the fisherman. Tiny villages cling to the lower slopes and towns nestle in the foothills.

From the northern boundary of New Hampshire the range rises rapidly to the lofty Presidential Mountains. Here Mount Washington, the highest peak east of the Rockies, with the exception of Mount Mitchell in North Carolina, lifts its shining summit 6,293 feet above the sea. Six other peaks in this range, Adams, Jefferson, Clay, Monroe and Madison, rise more than 5,000 feet, while Franklin, Pleasant, Clinton and Webster have altitudes of 4,000 feet or more. Mount Washington, whose summit is reached both by excellent roads and by a railway—the first cog railway ever built—has become a popular summer resort. On its summit a weather bureau and a fine hotel have been built, and many villas and inns border its woodland trails. One of the most interesting features in this region is Crawford Notch, a narrow gorge fifteen miles in length, with cliffs rising 2,000 feet above the roaring Saco River.

West of the Presidential Range, or the White Mountains proper, is the Franconia Range,

where Mount Lafayette lifts its bold summit 5,270 feet above the sea, and Profile, Liberty and Moosilaukee mountains exceed 4,000 feet in altitude. In the edge of the perpendicular cliffs of Profile Mountain, 1,500 feet above the road, Nature has carved a magnificent human profile, ninety feet in length. It is known as the "Old Man of the Mountain," and is said



"OLD MAN OF THE MOUNTAIN"
The picture in the oval presents a closer view of the projecting edge of the mountain.

to have inspired Hawthorne's beautiful allegory, *The Great Stone Face*. Other features of beauty and interest include the many lakes embosomed in the mountains, bleak Chocorua peak which, bare of vegetation, resembles a rocky fortress, or tower, and Franconia Flume, the great fissure cut by the swift Pemigewasset.

These mountains have become a great summer playground. Their slopes and summits are encircled by splendid roads and paths. Their forests are no longer a wilderness, but are the site of summer camps and hotels. E.B.P.

**WHITE PLAINS,** N. Y., the county seat of Westchester County, is situated twenty-two miles northeast of New York City, on the Bronx River and on a branch of the New York Central Railroad. There is interurban service to neighboring cities. The population was 15,949 in 1910; in 1916 it was 22,465 (Federal estimate). The area is about four square miles. Prominent features of the city are a $600,000 courthouse, a Carnegie Library, a Y. M. C. A. building and the state armory; the latter was built on the site of the old courthouse where, on July 10, 1776, the provincial congress proclaimed the independent state of New York. A large park and playground costing $200,000 have been constructed by the Bronx Parkway Commission. The city has the Bloomingdale Asylum for the Insane, and there are other hospitals. White Plains was settled in 1683. It was incorporated as a town in 1788 and became a city in 1916. In 1776 it was the scene of the Battle of White Plains, or Chatterton Hill.

**Battle of White Plains.** This engagement occurred early in the Revolutionary War, on October 28, 1776. Washington had evacuated Manhattan Island, and had brought the greater part of his forces to White Plains on the 23rd. Five days later General Howe sent a force of 4,000 men to attack the American outpost of 1,400, stationed on Chatterton Hill, on the west side of the Bronx River. After a spirited engagement the Americans withdrew to the main camp, losing about 140 men. Later Washington took up a strong position at North Castle.

**WHITE RIVER,** a river of Arkansas, which rises in the Ozark Mountains, flows northeast into Missouri, reënters Arkansas and flows southeast, principally through marshes, to join the Mississippi fourteen miles above the mouth of the Arkansas. Its length is 800 miles, and it is navigable by a system of locks and dams for 100 miles above Batesville—altogether about 480 miles. Batesville, Clarendon and Newport, manufacturing centers, are the principal towns on its banks.

**WHITE RIVER,** the chief Indiana tributary of the Wabash, formed by the union of the East and West forks, which flow in a general westerly direction from near the eastern state boundary. These headstreams unite near Petersburg. The main river flows southwesterly from the point of junction for a distance of fifty miles, and empties into the Wabash near Mount Carmel, Ill. Including the West Fork, the White River is about 350 miles in length. Indianapolis, the capital and largest city of the state, is on the West Fork, as are Noblesville, a city devoted largely to grain industries, Anderson, a railroad center, and Mar-

tinsville, noted for its artesian and mineral wells. The river is navigable to the latter city.

**WHITE SEA,** an arm of the Arctic Ocean, extending into Northern Russia. It has an outer division extending from the Kanin to the Kola peninsula, and an inner portion consisting of Kandalak, Onega and Dwina bays (see map, following page 2092). The Onega, the Dwina and the Mezen are the principal rivers which flow into it, and Onega and Archangel are the largest cities on its banks. Archangel (which see) is the most important city near the Arctic Circle.

**WHIT'LOCK,** BRAND (1869- ), the American diplomat who as United States minister to Belgium won world-wide admiration and gratitude for his services in the cause of humanity during the early period of the War of the Nations.

BRAND WHITLOCK

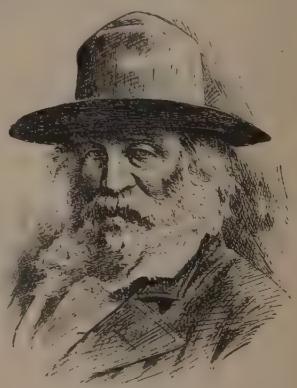
As a young man he had a varied newspaper experience in Toledo, Ohio, and in Chicago, Ill., after which he studied law and established a practice in Toledo, in 1897. He became mayor of the city in 1905, being elected on an independent ticket over four rival candidates. Serving four successive terms, he declined a fifth in order to accept appointment as minister to Belgium from President Wilson. When the German army invaded Belgium in 1914 it placed him in a peculiarly difficult position, as representative of the greatest neutral power. However, he proved himself fully equal to the situation. He not only supervised the relief of travelers and refugees, but lent his powerful influence to protect the Belgian population and prevent the destruction of property. He met every problem with rare tact and ability, and gave such untiring devotion to duty that his health broke under the strain and he was forced to return to the United States.

He has written an autobiography, published in 1914, entitled *Forty Years of It,* as well as various novels and political monographs, among these being *Her Infinite Variety, The Fall Guy, The Happy Average, The Gold Brick* and a *Life of Abraham Lincoln.* He has also written numerous magazine articles.

**WHIT'MAN,** MARCUS (1802-1847), an American pioneer and missionary, was born at Rushville, N. Y. After studying medicine at the Berkshire Medical Institution at Pittsfield, Mass., and practicing four years in Canada, he became a missionary to the Indians. In 1836 he went with his wife and two explorers to the site of the present city of Walla Walla, Wash. The party took the first wagon over the Rocky Mountains, and this led the way for the great overland emigration of later days. Quarreling at length occurred between his party and other missionaries who soon followed, and the board of missions refused further support. In midwinter Whitman traveled from Walla Walla to Boston, walking much of the Western portion of the trip, and induced the board to change its decision. Some writers have claimed that he made the dangerous journey to urge President Tyler to allow the territory of Oregon to be given to Great Britain, but this has been proved untrue. In 1847 the Indians murdered Whitman, his wife and twelve companions, probably because epidemic diseases, previously unknown to the red man, had entered the tribes through contact with white settlers.

Consult Eells' *Marcus Whitman: Pathfinder and Patriot;* Mowry's *Marcus Whitman and the Early Days of Oregon.*

**WHITMAN,** WALT (1819-1892), an American poet, born at West Hills, on Long Island, May 31, 1819. His ancestors for generations had been men who earned their living with their hands—there was not a scholar among them; Whitman himself left the Brooklyn schools at thirteen and learned his father's trade of carpentering. He also worked as a typesetter, taught school, wrote for magazines and for a short time published a weekly newspaper.



WALT WHITMAN

His leisure he spent among the ferrymen and other workers of the city, studying their life not as an outsider, but as one of themselves, for the democracy which made him choose these people as his companions was not assumed; it was an integral part of the

man. It is said that he drove a cab one entire winter to help a disabled cabman. His interest was repaid by the affection and confidence of the working people, and he became a political speaker of considerable influence among them. He wrote a novel, of which nothing but the name, *Frank Evans,* remains, and for a time he edited the Brooklyn *Eagle*. On his return from a long walking trip through Canada, the West and the South, he edited an unsuccessful Free-Soil paper, then worked at building and selling houses, meanwhile planning his first collection of *Leaves of Grass*. This came out in 1855 and received only ridicule until Emerson praised it highly.

During the War of Secession Whitman volunteered as an army nurse to care for his wounded brother, and remained in the hospital until peace was established, supporting himself by writing for the New York *Times*. Later he worked in the departments of the Interior and the Treasury until 1873, when a light stroke of paralysis, perhaps due to his army life, forced him to retire. At Camden, N. J., he spent his later years serenely, despite feebleness and poverty. He never married. Whitman was over six feet tall, finely proportioned, and in his earlier years rugged looking.

His last years were devoted to enlarging his *Leaves of Grass,* which has excited much discussion. Whitman's purpose was to describe the development of America and to be the prophet of democracy, of freedom, of naturalness and of the brotherhood of man. His efforts at naturalness are often extreme and sometimes ludicrous, and his poetry lacks the meter and rhyme which would make it more widely readable. Aside from its roughness and its many failures, however, it has at times an original force and a sureness of insight which make it rank with the truest poetry produced in America. In Europe Whitman has always been very popular, as the most representative American writer, and his fame grows in his own country constantly. His widest known poem is that on the death of Lincoln, "O Captain! My Captain!" A.MC C.

Consult Noyes's *Approach to Whitman;* Burroughs's *Whitman: A Study.*

**WHITNEY,** *whit'ni,* Adeline Dutton Train (1824-1906), a writer of poems and novels for young people, which were widely read in her own day. She was born and educated in Boston, and was a cousin of George Francis Train, a well-known author and lecturer. At the age of nineteen she married Seth D. Whitney, of Milton, Mass. Although she was a contributor to periodicals in her girlhood, her best literary work was done after 1859, when she wrote more than twenty volumes, all of which were entertaining in style and wholesome in tone. Probably her best-known story is *Faith Gartney's Girlhood.* Included among her other works are *Patience Strong's Outings, Real Folks, Pansies* and *We Girls.*

**WHITNEY,** Eli (1765-1825), an American inventor, whose cotton gin is one of the most important of all inventions connected with the world of industry. He was born at Westboro, Mass., and was graduated at Yale in 1792. In the same year he removed to Georgia to teach school, soon forming an acquaintance with the widow of General Nathanael Greene, who lived on the banks of the Savannah River. Mrs. Greene found him such an adept in making useful devices that when some of her neighbors complained of the uselessness of cultivating cotton because of the seed, she appealed to Whitney to see what he could do about separating the seed from the cotton.

ELI WHITNEY

For several months Whitney worked at a machine, forced first to make his own tools. Toward the close of the year 1792 his simple mechanism was nearly completed, and he found that under the guidance of one man it would clean a thousand pounds in the time required to clean five pounds by hand. He had worked secretly, but before his gin was completed some lawless men broke into his shop and carried off his invention. Before he could secure a patent several machines were constructed on his model. With a Mr. Miller, a man of means, he went to Connecticut in 1793 to manufacture cotton gins. The succeeding five years were filled with misfortune. Lawsuits took all his profits as well as the $50,000 granted to him by the state of South Carolina; rivals declared that a machine like his had earlier been constructed in Switzerland, and that his machine tore the fiber of the cotton; his partner died, and a fire utterly destroyed his factory.

In 1798, despairing of ever profiting by his invention, Whitney turned his attention to the making of firearms. A manufactory was located at Whitneyville, Conn., and there he first demonstrated the success of division of labor (see LABOR, DIVISION OF), by means of which each part of the firearm should be completed separately. The government gave him large orders for muskets, and he soon grew rich. So carefully had his ingenious mind planned all details of his armory that it became the model upon which the national armories were later constructed.

To the end of his life Whitney received only the slightest credit for his invention of the cotton gin; succeeding generations, however, have dealt justly by his memory and credit him with the greatness of his achievement.

See COTTON, for further information on the revolution wrought by Whitney's invention.

**WHITNEY,** SIR JAMES PLINY (1843-1914), a leading Canadian lawyer and former premier of Ontario. In that province, at Williamsburg, he was born, and there his active life was spent. He was admitted to the bar in 1876 and rose steadily in his profession, reaching the post of king's counsel in 1900. Before that date, however, he had identified himself with the Canadian militia, in which he held a commission as lieutenant - colonel, and he took part in the Fenian troubles.

SIR JAMES PLINY WHITNEY

In 1886 he was defeated for membership in the legislature, but was successful in 1888. Reëlection followed regularly, and in 1896 he had become leader of the opposition. When the Ross government was defeated in 1905 Whitney formed a new cabinet; in which he held the post of attorney-general as well as premier. He continued as premier until the year of his death. In 1908 he was knighted.

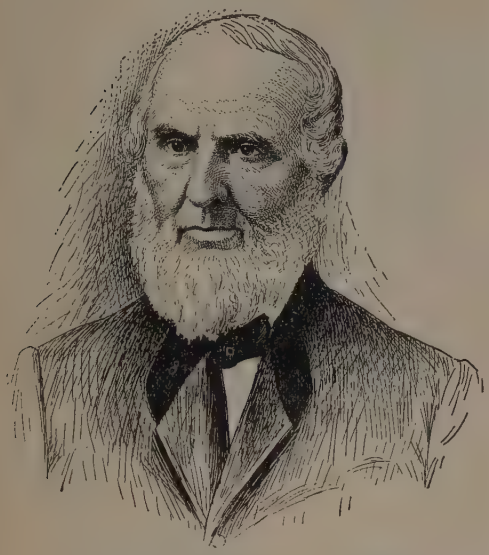
**WHITNEY,** WILLIAM COLLINS (1841-1904), an American lawyer and statesman, of whom Grover Cleveland said, "There have been men who have had great qualities of mind, and men who have had great qualities of heart, but very few in whom both have been joined in such a measure." Whitney was born in Conway, Mass. After completing his education he began the practice of law in New York City, where he became active in Democratic politics and in the opposition to the corrupt Tweed Ring. As corporation counsel of New York City, he saved the city large sums of money through honest and efficient management of his department. He favored Grover Cleveland's candidacy for the governorship of New York, and when Cleveland became President Whitney was appointed Secretary of the Navy. In this position he was active in building up the navy. Whitney was the manager of Cleveland's second campaign for the Presidency. He was identified with important financial interests in New York, and left a great fortune to his sons, Harry Payne Whitney and Payne Whitney. The wife of the former, who was Miss Gertrude Vanderbilt, is a sculptor of considerable fame.

**WHITNEY,** MOUNT, the highest mountain in the United States, excluding Alaska. It has an altitude of 14,502 feet and is situated in the southern part of the beautiful Sierra Nevada range of California. This portion of the Sierra Nevada, just opposite Owen's Lake, with its cluster of granite pinnacles and domes that rise abruptly to a height of over 10,000 feet above the valley below, presents some of the grandest scenery in the United States. The mountain was named after the American geologist, Josiah Dwight Whitney (1819-1896), who was state geologist of California from 1860 to 1874.

**WHITTIER,** *whit'i er,* JOHN GREENLEAF (1807-1892), one of the greatest of American poets, was born at East Haverhill, Mass., December 17, 1807. His ancestors on both sides had been New Englanders since about 1638. His family, who were hard-working, influential Quakers, are well described in *Snow-Bound,* which gives also a very attractive picture of the pleasures and the duties of the children in the Whittier home. The Bible was almost his entire library at first, until from the teacher of the little district school he learned of Burns, the poet who more than any other inspired him in his work. This teacher, staying one night at the Whittier home, read aloud from the Scottish poet, and to the young Whittier it seemed that a new earth was opening before him.

From that time on he wrote verse, and at eighteen he sent an anonymous poem to the *Free Press,* at Newburyport. It was printed; others followed, and finally the editor, William Lloyd Garrison, became interested in the poet, found out his whereabouts from the postman,

and visited him. With Garrison's encouragement Whittier determined to have a better education, and by making slippers and teaching school he paid for two terms at Haverhill Academy, which ended his schooling. At



JOHN GREENLEAF WHITTIER

twenty-one, however, he had read widely, observed closely, felt deeply, and was by no means unfitted for the brilliant future that was before him.

**The Poet of Abolition.** After editing several papers and gaining some distinction in politics, Whittier was made a delegate to the Whig convention at Baltimore which nominated Clay for the Presidency, but was compelled by illness to resign, and in 1833 was forced to give up his editorship, also. From 1832 to the end of the war Whittier was the great poet of the abolition movement; he dedicated to freedom all his gifts as a leader and a singer. He issued at his own expense his pamphlet *Justice and Expediency* (1833), and during the next five years, it is said, produced a poem on freedom weekly. Meantime, he took up a work much more difficult to his nervous temperament—that of an active politician. In 1833 he acted as secretary of the Philadelphia national convention, and later served one term in the Massachusetts legislature; but on his reëlection declined further service because of continued ill health. Unlike Garrison, he wished to fight slavery with the ballot.

In 1836 he moved to Amesbury, the home of his later life. He served as a secretary of the American Anti-Slavery Society and accompanied George Thompson on a lecture tour, during which they were mobbed at Concord, N. H. Whittier then became editor of the *Pennsylvania Freeman;* and though Pennsylvania Hall, in which he had his office, was burned by a mob, he kept on at his work for two years, until ill health finally forced him to retire. From early manhood he was subject to a painful and dangerous heart trouble, was tortured incessantly by sleeplessness and suffered from severe headaches whenever he worked. For this reason he became practically a recluse and saved his strength for short periods of writing.

**Variety of His Poetry.** His poems on freedom continued to appear, but he wrote other poems as well. A volume of ballads, collected in 1843, was the first publication that paid him financially. After several times appearing as the Liberal candidate for Congress, he refused to stand in 1843, when his election seemed likely. His verses and editorials appeared in the *National Era,* the *New England Magazine* and the *Atlantic Monthly.* To the period ending in 1865 belong his *Songs of Labor, Ichabod, Maud Muller* and *Barbara Frietchie.*

After the war, literature became his chief occupation. *Snow-Bound,* in 1865, made him well-to-do, but his mother and sister, for whose sake he desired success, were dead, and his wealth went to charity. *The Tent on the Beach* appeared in 1867; *Among the Hills* in 1869, and other works of high quality later.

His niece, who kept house for him after his sister's death, married in 1876, and he was again left alone. Deafness also came upon

THE WHITTIER HOME AT AMESBURY

him, but he kept up his correspondence with his friends and visited each year his relatives at Oak Knoll, Danvers, Mass. He died while on a visit to Hampton Falls, N. H., September 7, 1892.

**The Man and His Work.** Whittier was six feet tall, slender and very straight. His mouth was sensitive and refined, and his deep, dark eyes showed his common ancestry with Webster and Hawthorne. He was a delightful talker, with a plain, direct manner which put every one at ease. He never married, and in one of his poems hinted that death had early ended his romance. Music and art had little or no attraction for him, and he never attended the theater. His life, as well as his poetry, was molded by his religious faith and insight.

Whittier's verse is sometimes rough, poorly rhymed and loosely worded. These faults come, however, from the very ease with which he wrote, and to have remedied them might have been to lose the qualities which have made his work live. His poems of freedom are usually too full of the slavery debate to be great poetry, but they have at times an almost terrible energy—a spirit far from Quakerlike. Whittier was not, indeed, distinguished for meekness and submissiveness, yet he would have allowed the South to secede peacefully. *Snow-Bound* will long stand as the true story of the old, rugged New England. His hymns breathe the very spirit of Christianity; and his use of the most effective details, as in *The Barefoot Boy,* his fineness of sentiment, as in *Telling the Bees,* and his story-telling power, as shown in his ballads, are not surpassed in American literature. A.MC C.

Consult Carpenter's *John Greenleaf Whittier;* Higginson's *Whittier,* in English Men of Letters Series.

**WHOOP'ING COUGH,** a highly contagious disease of which children are the principal victims. It is a more serious ailment than is generally supposed, and yearly causes thousands of deaths because of complications, such as bronchitis and pneumonia. The early symptoms are running of the nose, slight fever and a dry cough. In the course of a week the child begins to have paroxysms of coughing, and as it draws in its breath a sharp, shrill noise may be heard, known as the "whoop." Even in mild cases there are four or five coughing spells a day, and in severe ones a great many more than this. The climax of the disease occurs about the end of the fourth week, after which the paroxysms gradually diminish in number and severity.

Every mother should be careful to keep a child afflicted with whooping cough away from other children, for the disease spreads very rapidly. During the course of the attack the discharges from the nose and mouth should be received in pieces of cloth, and these should be burned. The little patient should have his own dishes and silver, and separate wash cloths and towels. It is important to give the child nourishing food and to have the sleeping room well ventilated. Fresh air is one of the best aids in curing the disease. When the weather permits, the child should play out-of-doors (by himself) as much as possible. It is well to have the advice of a good physician from the beginning of an attack. C.B.B.

**WICHITA,** *wich'i taw,* KAN., the county seat of Sedgwick County, situated in the southern part of the state, and after Kansas City the largest city in Kansas. It is situated on the Arkansas River, at the point where it receives the waters of the Little Arkansas, seventy-six miles southwest of Emporia and 213 miles southwest of Kansas City. It is the distributing point for a large district, having the service of the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Frisco, the Kansas City, Mexico & Orient, the Midland Valley and the Missouri Pacific railways. Electric lines connect Wichita with cities and towns north. The place was settled in 1870 by Indian traders, and was named for the Wichita tribe of Indians. In 1871 it was incorporated, and in 1872 it was chartered as a city. In 1909 it adopted the commission plan of government, and in 1917 a city manager was provided. In 1910 the population was 52,450; in 1916 it was 70,722 (Federal estimate).

A large territory around Wichita produces live stock and an abundance of grain, especially wheat and corn, and the city is an important market for these products and for dry goods, groceries, hardware, broom corn and machinery. There are large wholesale and jobbing houses. The leading industrial plants are stockyards, meat-packing houses, confectioneries and manufactories of saddlery, harness, clothing, brooms and tobacco products. The car and repair shops of the Kansas City, Mexico & Orient Railway are located here. Wichita has a handsome county courthouse, a Scottish Rite Masonic Temple and a Roman Catholic Cathedral. The Mason's Home, Live Stock Exchange, City Hall, Commercial Club, Y. M. C. A. building, Schweitzer office building, Union Station and Terminal, and the Forum, with a seating capacity of about 8,000, are all especially noteworthy. For advanced education the city has Fairmount College, Albert Magnus College (Roman Catholic), All Hallows Academy,

Lewis Academy, Friends' University, Kansas College of Osteopathy, and a public library with about 8,000 volumes.

**WICHITA FALLS,** Tex., the county seat of Wichita County, is in the north-central part of the state, twenty miles south of the Oklahoma state line and 114 miles northwest of Fort Worth. It is on the Wichita River, a tributary of the Red River, and on the Fort Worth & Denver City, the Missouri, Kansas & Texas, the Wichita Falls & Northwestern and the Wichita Valley railroads. There is considerable manufacturing, and the principal products are window glass, fruit jars, auto trucks, flour, brooms and oil-well machinery. Wichita Falls was settled in 1882 and became a city in 1884. Its population was 8,200 in 1910, and 12,124 (Federal estimate) in 1916. F.B.J.

**WIDGEON,** *wij'un,* a river duck recognized by hunters by its note, "whew, whew, whew," which it utters when swimming and feeding and which also serves as a guide to its whereabouts. Widgeons have a habit of robbing canvasback

THE WIDGEON

and other diving ducks of wild celery and other food, snatching it from their bills as soon as they appear above the water. The *American widgeon,* or *baldpate,* nests from Minnesota northward, wintering in Central America and Northern South America. Its eggs are seven to twelve in number and of a buffy-white color. The *European widgeon* is found in the northern part of the Old World, and is of occasional occurrence in the Eastern United States.

**WIELAND,** *ve'lahnt,* Christoph Martin (1733-1813), a poet and writer of fiction, born at Oberholzheim, in Württemberg, Germany. He studied law at the University of Tübingen, but showed far more interest in literature. While in the university he was much affected by the puritanical piety prevailing in some circles of the students, an influence shown very clearly in his *Twelve Moral Briefs,* written when he was but eighteen years old, and his didactic poem, *Anti Ovid.* He determined to devote his entire time to literary pursuits and began this career by undertaking a great epic on the deeds of Cyrus the Great. At the age of twenty-six he had finished five cantos, but finding the task too great for him, he abandoned it and wrote a successful poem, *Araspes and Panthea.*

By 1759 he was intensely interested in Greek literature, especially its poetry, and this study so affected his ethical and religious views that when he went in 1760 to Biberach, Germany, to reside, he was noted not only for his careless lightheartedness, but for his skepticism. Under this new influence he wrote *Nadine,* a poem filled with the Greek joy of life, *The Adventures of Don Silvio,* a tale modeled on *Don Quixote* and ridiculing cold idealism, and the *Comic Tales,* written in sheer fun. He had, however, been doing some very serious work meanwhile, had translated twenty-eight of Shakespeare's plays and had written some poems extolling intellectual power above mere physical beauty.

In recognition of his ability he was appointed professor of philosophy at the University of Erfurt, Germany, in 1769, but three years later accepted the invitation of a duchess to teach her sons. With abundant leisure he then produced such vigorous and dramatic poetry as the *Choice of Hercules* and his famous romantic epic, *Oberon.* His last days were noteworthy for their serenity, optimism and tone of culture, which qualities are evident in his works of this period. During his eighty years he wrote an enormous amount, and the authorized edition of his works totals fifty-three large volumes.

**WIESBADEN,** *vees'bah den,* a noted watering place of Prussia, Germany, situated in a sheltered valley on the southern slope of Mount Taunus, six miles north of Mainz. The surrounding hills are densely wooded and protect the city from the bleak winds of the north and east. There are numerous mineral springs in the city and vicinity, and in normal times thousands of visitors from all parts of the world are attracted to the place each year by these waters and by the pleasant climate. Wiesbaden is purely a residential town, without any industries of importance. Its streets are scrupulously clean, and special efforts have been made to make the stay of tourists comfortable

and to keep them well entertained. The chief places of interest are the Pavilion, with its flower garden and fountain; the Royal Court Theater, the Royal Picture Gallery, the library and the town hall, with its textile museum. The springs were known to the Romans, and many relics of the Roman period have been discovered in the neighborhood. Population in 1910, 109,002.

**WIG'GIN,** KATE DOUGLAS. See RIGGS, KATE DOUGLAS WIGGIN.

**WIGHT,** *wite,* ISLE OF, an island off the south coast of England, forming part of Hampshire, from which it is separated by the Solent, a strait from two to five miles wide. It covers an area of 147 square miles. The island is noted for its pleasant climate and beautiful scenery and attracts many thousands of visitors annually, certain parts being particularly suitable as a winter resort for sufferers from pulmonary complaints. The chief town is Newport; it is also the leading port, famous all over the world for its regatta at Cowes; Ryde, Shanklin, Ventnor, Sandown are other well-known and popular resorts. Communication with Southampton, Portsmouth and Lymington is frequent, and there is a railway system connecting all the important points on the island. The chief industry is agriculture; sheep raising is extensive, and the wool is noted for its purity. The population is about 82,000.

Osborne House, near Cowes, was a favorite residence and the scene of the death of Queen Victoria of England. The island contains many relics of Roman occupation, and was the scene of almost incessant warfare for several centuries. Carisbrooke Castle was the prison of King Charles I during his struggle with Parliament.

Consult Thomas's *The Isle of Wight.*

**WIL'BERFORCE,** an English family notable for successful efforts against human slavery and in the Tractarian Movement, the latter resulting in notable accessions to the Roman Catholic Church in England.

**William Wilberforce** (1759-1833), a famous English statesman and philanthropist, the leader in the English movement for the abolition of the slave trade (see SLAVERY). He was born at Hull and educated in the grammar school there and at Saint John's College, Cambridge, showing marked ability but failing through his fondness for social life to take advantage of all his opportunities. In 1780 he entered Parliament from his native town. There he became very intimate with William Pitt, with whom he had been acquainted in his university days, and the friendship lasted until Pitt's death. It was in 1787 that he first began the agitation for the abolition of slavery, to which he devoted his energies for the rest of his life.

In 1789 a set of resolutions condemning the slave trade and in 1792 a motion for its gradual abolition passed the House of Commons, but it was not until 1807, after the death of Pitt, that the bill for the total abolition of the trade passed both Houses. After that time Wilberforce directed his energies toward emancipation, constantly presenting the cause in the House of Commons, in which he sat from 1784 to 1812 as member for Yorkshire and after 1812 for Bramber. In 1825 failing health compelled him to resign his seat, but the movement against slavery was not allowed to languish, and three days before his death Wilberforce heard that the Emancipation Bill had passed a second reading. A month after his death it was enacted into law.

Wilberforce had interested himself in other philanthropic and religious projects, such as the founding of schools and Sunday Schools, had published *A Practical View of the Prevailing Religious System of Professed Christians* and had edited the *Christian Observer.* His *Life* and *Correspondence* were published by his sons.

**Samuel Wilberforce** (1805-1873), third son of William Wilberforce, who as dean of Westminster was one of the central figures in the Tractarian, or Oxford, Movement. He was born at Clapham, London, studied at Oriel College, graduating with honors, and in 1830 became rector of Brightstone, in the Isle of Wight. In 1839 he was made archdeacon of Surrey, and in 1840 became canon of Winchester and rector of Alverstoke. These posts, while they made evident his ability, were too narrow in scope for his unusual talents, and in 1845 he was made bishop of Oxford. The culmination of the Oxford Movement (which see) and the secession to the Church of Rome of many of the High Church party, including several members of his own family, made his position an unpleasant one, but his tact and magnetic personality soon remedied the difficult situation. In 1869 Gladstone made him bishop of Winchester, but he lived only four years afterward. He published, with his brother, the *Life* and *Correspondence* of his famous father, and wrote a number of works on religious topics. A.MC C.

**WIL'COX,** ELLA WHEELER (1855- ), an American poet and journalist, born at Johns-

town Center, Wisconsin. She was educated at the University of Wisconsin, and while still in school showed much talent in writing, especially in verse forms. After leaving college she became a frequent contributor of verse to magazines and newspapers, and between 1875 and 1880 attracted considerable attention and some rather severe criticism because of her frank and unconventional expressions on subjects and emotions not generally discussed in American poetry. Her first collection of poems was refused by several publishers because of this frankness, but her books when issued have always sold widely and received much favorable notice. In 1884 Miss Wheeler married Robert M. Wilcox of Meriden, Conn., and soon afterwards moved to New York, where she became one of the most popular newspaper writers. During recent years she has been enthusiastic in the modern ethical movement known as New Thought, and has written many essays and poems in its behalf. Doubtless her best-known work is the collection entitled *Poems of Passion,* published in 1883, but there are numerous other volumes to her credit, among them *Poems of Pleasure, Poems of Sentiment, Poems of Progress* and *Poems of Power.* Besides these are the novels *Mal Moulée, A Double Life, Sweet Danger* and *An Erring Woman's Love.* Her work is characterized by much sentiment and optimism.

**WILD BAR'LEY,** or **SQUIR'RELTAIL GRASS,** a troublesome member of the grass family, found in various parts of the North American continent. Like most other weeds, it multiplies rapidly, and it is a pest in grain fields, gardens and dooryards. The plant bears a slender, rounded stem which reaches a height of about two feet. The spikes of flowers are surrounded by a bristly beard, somewhat resembling a squirrel's tail. The seeds cling to the wool of sheep and irritate the hide, and the leaves and flowers sometimes stick in the throat of grazing animals and cause them to choke. This weed is eradicated by thorough cultivating of fields and destruction of plants before they produce seed.

**WILD CAT,** or **CAT'AMOUNT,** terms applied generally to small, wild species of the cat family, and in North America given to three small species of lynx. The latter are night-prowling animals having slightly longer bodies, longer legs and shorter tails than have domestic cats. Their ears are tufted, and their coats vary in color and thickness, the northern species having the longer, softer fur. The Canadian lynx has a long, clear-gray coat, and the bobcat of Southwestern United States has short, yellowish-brown fur covered with dark spots and other markings.

The true wild cat is the European species, an extremely vicious animal, larger and stronger

WILD CATS

than the domestic cat, with yellowish fur and black streaks around the body, legs and tail. Of the numerous tropical species, the most interesting is the Egyptian cat, said to be the ancestor of the domestic varieties. Unlike other wild cats, it has a long, slender tail. Its fur is yellowish in color and obscurely striped on body, legs and tail. The feet are black, and for this reason it is often called the *gloved cat.*

**WILDCAT BANKS,** a name applied to the unstable banking institutions established after President Jackson's removal of the deposits of the United States Bank (see page 3098). As the funds of this bank were deposited in state banks, the President's action encouraged the establishment of numerous banks under state control, especially in the South and Southwest. These institutions issued large amounts of paper money, regardless of the amount of specie in reserve, and the country passed through a period of wild speculation. In 1836, alarmed by the recklessness with which the banks issued notes, Jackson issued his famous "Specie Circular," which ordered government agents to accept only gold or silver in payment for public lands. Unable to meet the demands made upon them when their notes were presented for redemption, large numbers of the wildcat banks failed. In 1837 the country faced one of the most serious financial panics in its history.

**WILDE,** Oscar Fingall O'Flahertie Wills (1856-1900), a poet, novelist and essayist, was born at Dublin, Ireland. He showed unusual talent, and both at Trinity College, Dublin, and Magdalen College, Oxford, won prizes and first-class honors for excellence in literary work. At Oxford he attempted to start what he

called an aesthetic movement, in which beauty should be the aim of all effort. He scorned sports, decorated his rooms with lilies, old china, peacock feathers and so-called artistic bric-a-brac, wore his hair long, carried a dainty fan, affected a languishing appearance and wept over the subject of art. His classmates promptly ducked him in the river and wrecked his apartments.

The movement spread, however, and for some years a drooping attitude and carelessly worn clothes were in fashion among young English gentlemen. Du Maurier, the author of *Trilby,* drew such ridiculous pictures of the style in *Punch,* and Gilbert and Sullivan so keenly satirized it in their opera, *Patience,* that the followers of Wilde gave up many of their affectations. In 1881 Wilde's first collection of poems was published, but his first success came with the appearance of *The Happy Prince and Other Tales,* in 1888. This was a collection of fairy stories which won praise throughout England and America. There followed a novel, *The Picture of Dorian Gray,* the essays, entitled *Intentions,* and the plays, *Lady Windermere's Fan, A Woman of No Importance* and *The Ideal Husband,* brilliant in both style and thought. In 1893 his drama, *Salomé,* was produced in Paris by Sarah Bernhardt. Two years later he was convicted in the English courts of gross immorality, and spent the next two years in prison, where he wrote his most powerful poem, *A Ballad of Reading Gaol.* His last days were passed under an assumed name in Paris.

**WIL'DERNESS,** Battle of the, the first important battle directed by Grant after his appointment to the supreme command of the Federal armies in the War of Secession. The Wilderness, a tangled forest region south of the Rapidan River, in Virginia, was entered by Grant's army of 120,000 on May 4, 1864. The Federals were opposed by the Confederate Army of Northern Virginia, numbering 62,000, and commanded by Lee. This was the initial battle of Grant's campaign of pounding his way to Richmond. Though his army outnumbered Lee's two to one, he was met with desperate resistance. The dense woods made fighting in the open impossible, and both sides suffered greatly. The battle raged for two days—May 5 and 6—and was without decisive results. Shortly afterwards the armies met again at Spottsylvania Court House (which see). See War of Secession, subhead *The Year 1864,* for other details.

**WILHELMINA,** *vil hel me' nah* (1880- ), the only daughter of William III of the Netherlands, and of Emma, daughter of Prince George Victor of Waldeck, succeeded her father as sovereign of the Netherlands in 1890. As she was only ten years old at the time, Queen Emma acted as regent until August, 1898, when Wilhelmina was formally crowned queen in Amsterdam. Three years later she was married to Henry Frederick, Duke of Mecklenburg-Schwerin, a German prince. Princess Juliana, their daughter and heiress to the throne of Holland, was born in 1909. Queen Wilhelmina is a charming woman, and loved by all her people.

**WILKES,** *wilks,* Charles (1798-1877), the American naval officer who seized the Confederate envoys, Mason and Slidell, from the British mail steamer *Trent* in the War of Secession. Born in New York City, he entered the United States navy at twenty, and became a lieutenant eight years later. While in command of a government expedition, he visited several lands lying in Southern waters. He held that he discovered an Antarctic continent, but his statement was not generally believed. His reports, however, were of great scientific value. Wilkes was promoted to a captaincy and was later made commander, and at the beginning of the War of Secession was placed in command of the *San Jacinto.* On November 8, 1861, he gained wide publicity by his removal of the Confederate commissioners from the *Trent* (see Trent Affair, The). Wilkes was made commodore in 1862, put on the retired list two years later, and made rear-admiral on the list in 1866.

**WILKES-BARRE,** *wilks' bair e,* Pa., the county seat of Luzerne County, is situated in the beautiful Wyoming Valley of the Alleghany Mountains, in the northeastern part of the state, in a rich anthracite coal region. It is known locally as the "Heart of the Anthracite." The city is on the Susquehanna River and on the Central of New Jersey, the Delaware & Hudson, the Lehigh Valley, the Pennsylvania and the Lackawanna & Wyoming Valley railroads, and on electric interurban lines. Philadelphia is 145 miles southeast. The population was 67,105 in 1910 and 76,776 (Federal estimate) in 1916. Wilkes-Barre is the wholesale trading center of a number of towns whose combined population is 1,500,000.

**Parks and Buildings.** City parks and playgrounds have a combined area of 150 acres. On the city (east) side of the Susquehanna is

the River Common, and across the river, which is spanned by several bridges, is a large natural park with a bathhouse and public bathing beach. Harvey's Lake and Sans Souci Park are resorts near the city. Noteworthy public structures include a Federal building, erected in 1905 at a cost of about $125,000; a courthouse which cost $2,000,000; Irem Temple, an interesting example of Moorish architecture; a city hall, armory, Y. M. C. A. and Y. W. C. A. buildings; Osterhout Free Library, a $500,000 high school and several churches. The Museum of the Wyoming Historical and Geological Society contains many interesting historical relics. Among these is a painting of Frances Slocum, who, as a child, was kidnaped by the Indians and later became the wife of an Indian chief. The city has the Harry Hillman Academy, Saint Ann's Academy and Wyoming Seminary. There are several large hospitals, homes for friendless women and children and similar institutions.

**Industries.** Luzerne County is one of the most productive coal regions in the United States; the value of its coal output is greater than that of the gold production of the United States, including Alaska. Aided by abundant cheap fuel, manufacturing has developed to important proportions. In the city are some of the largest lace and silk mills in the United States. Among other extensive factory products are locomotives, engines, boilers, cement and sugar mill machinery, wire rope and insulated wire, mining machinery and adding machines.

**History.** Wilkes-Barre was founded in 1769 by emigrants from the colony of Connecticut. The mother colony claimed this territory, but the claim was disputed by the Pennsylvanians, or Pennamites, as they were called, before and for several years after the War of Independence. The Decree of Trenton in 1782 gave Pennsylvania jurisdiction over the territory, and the settlers were confirmed in their titles to the land. Many monuments throughout this region mark the places of historic events. In the Public Square, in the heart of the city, is a monument to John Wilkes and Colonel Isaac Barre, two members of the English Parliament who had sympathized with the colonies prior to the War of Independence. The monument marks the site of the old fort which gave refuge to women and children at the time of the great Wyoming Massacre, during the War of Independence. The site of the massacre is marked by the Wyoming Monument. Queen Esther's Rock, the home of Frances Slocum, the Fell House and old forts are historically interesting. The city was chartered in 1871. It adopted the commission form of government in 1913. R.W.F.

**WILKIE,** *wil'ki,* a town in the central-western part of Saskatchewan. It is a divisional point on the Canadian Pacific's line between Winnipeg and Edmonton, and is also the terminus of several short branches. By rail Wilkie is 579 miles northwest of Winnipeg, 269 miles southeast of Edmonton and 100 miles west of Saskatoon. Branches from Wilkie run to Kerrobert, forty-four miles southwest; to Kelfield, thirty-five miles southeast; and to Cutknife, twenty-nine miles north. Wilkie was founded in 1908, and was named for Daniel Robert Wilkie (born 1846), president of the Imperial Bank. It was incorporated as a town on November 1, 1910. Population in 1911, 537; in 1916, about 1,200.

Wilkie is a large shipper of wheat, its elevators having a capacity of nearly a quarter of a million bushels. There is a flour mill and several lumberyards. The exhibition grounds, government immigration hall and Royal Northwest Mounted Police barracks are features worthy of special mention.

**WILKIE,** Sir David (1785-1841), a painter who is noted chiefly for his sympathetic and charming pictures of Scottish life and scenes. He was born in Cults, Fifeshire, and received his art training in Edinburgh and in the Royal Academy schools, London. Wilkie's first important picture—*Village Politicians*—was exhibited in 1806. This was followed by *Blind Fiddler, Village Festival, The Bagpiper, Rent Day* and others, all characterized by humor, simplicity and a kindly realism. In 1811 he was elected a member of the Royal Academy, in 1830 was appointed court painter and six years later was knighted. In his later years he attempted historical pictures and portraits, but was less successful than in his particular field of portraying everyday life. He died while on a trip abroad, and was buried at sea.

**WILKINS,** Mary Eleanor. See Freeman, Mary E. Wilkins.

**WIL'KINSBURG,** Pa., a residential borough of Pittsburgh, situated five miles east of the city in Allegheny County, in the southwestern part of the state, and on the Pennsylvania Railroad. Electric lines operate to Pittsburgh and to other cities. Wilkinsburg is distinctly a residential borough, the majority of its people being employed in Pittsburgh. The chief

industrial plants are an ice plant and a planing mill. The borough has five fine school buildings, a high school completed in 1911 at a cost of $400,000, a Carnegie Library, twenty-two churches, the United Presbyterian Home for the Aged and Columbia Hospital. There are no saloons. The original name of the place was changed from McNairville to Rippeyville, and the latter to Wilkinsburg, in honor of William Wilkins, who was Secretary of War in 1843-1845. It was incorporated as a borough in 1887. The population increased from 18,924 in 1910 to 23,228 (Federal estimate) in 1916.

**WILL,** in law, an instrument providing for the disposal of one's property at death. To avoid the probability of a successful contest it is advisable to have a will drawn by an attorney or some other authority who is familiar with the customary legal form. The one who makes the will is called the *testator,* if a man, and the *testatrix,* if a woman. If there are different parcels of real estate going to different persons, each parcel should be sufficiently described to assure complete identification. Personal property should also be described so that it can be identified, though the omission of such description does not render the will void.

The testator can dispose of his property in any way he chooses, provided the disposal is not contrary to law. The will must be signed by the testator and by at least two witnesses. It usually names some person as executor, whose duty it is to see that the wishes of the testator are complied with after his death. If no executor is named, the court having jurisdiction over estates sees that the provisions of the will are carried out.

While a formal will is desirable, it is not an absolute necessity. Any person may write his will in simple language, and it will meet all legal requirements, if the provisions are so plain that they will not be misunderstood. But whatever the form of the will, it must be signed by the testator and by two witnesses. The following is a simple form of will which is in all respects legal:

I, John Thompson, do make my will as follows:

All my estate I devise and bequeath to my wife, Marion B. Thompson, for her own use and benefit forever, and hereby appoint her my executrix, without bonds, with full power to sell, mortgage, lease, or in any other manner to dispose of the whole or any part of my estate.

JOHN THOMPSON (Seal).

Dated Jan. 10, 1918.

Subscribed, sealed, published, and declared by John Thompson, testator above named, as and for his last will, in presence of each of us, who, at his request, in his presence, in presence of each other, at the same time have hereunto subscribed our names as witnesses this Jan. 10, 1918, at the village of Oak Park, County of Cook, and State of Illinois.

FREDERICK PRINCE,
MARTHA NEAL,
JAMES MCMAHON.

A *codicil* is an addition made after the will has been drawn up, which modifies it in some particular. A will may be altered in some respect or be destroyed by the testator at any time, and such alteration will be legal provided the testator is of sound mind and it can be shown that the alteration was not caused by undue influence of parties interested in the change.

Each state of the Union and each province of Canada has its own laws governing in detail the execution of wills. See PROBATE.

Consult Borland's *Law of Wills and the Administration of Estates;* Schouler's *The Law of Wills.*

**WILL,** that form of mental activity which is concerned with choice and action. Every idea impels to action, and we would carry every idea into action if environment or contracting ideas did not restrain us. Think of the stars and you involuntarily look upward. The thought of a cold bath on a frosty morning may cause you to shudder, but when this thought is succeeded by the thought of the tonic effect that follows, you may plunge in. The will is sometimes called the motor element in ideas. Actions are of two classes—impulsive, or involuntary, and deliberate, or voluntary.

**Impulsive Action.** A child is born with tendencies to perform certain acts, as nursing, or moving its arms and legs, or crying. In the beginning there is no conscious purpose in these movements, but through them the child may derive satisfaction. The feeling of hunger is satisfied through nursing, the tension of the muscles is relieved by movement of the limbs, and attention from the parent is secured by crying. In time the child associates these effects with the movements by which they are secured, and whenever hunger or muscular stress is felt relief through the proper action is secured. What was begun as impulsive and purposeless is in the course of time changed into purposeful, deliberate action. As the child develops, many actions, such as reaching for objects, standing, walking, cooing and the like, are developed in a similar way.

**Deliberate Action.** We have seen that impulsive, purposeless actions become purposive in time because of the pleasure or protection from pain derived through them. If we analyze our own mental processes we see that a deliberate act consists of four steps—desire, deliberation, choice and action.

*Desire.* Most acts yield impressions which are retained. We recall the pleasure or pain derived from an experience and wish to repeat it, if pleasurable, and avoid it, if painful. A pleasurable experience leaves a memory which leads to a *desire* to have the experience repeated. In addition to our own personal experiences we read and hear about pleasurable experiences of others, and our desires thus extend beyond our own experience. We have no desire for an experience that we know nothing about. Again, we may have experiences which are unpleasant, such as burning the hand on hot objects, experiencing the bitter taste of medicines, and feeling the irritation arising from the association with some person with whose temperament ours does not harmonize. We strive to avoid these experiences. We even put forth strenuous effort to avoid them; that is, we have an *aversion* to them.

*Deliberation.* People often have two or more ideas or desires in the mind at once, and can act upon only one of them. They may be in conflict. For instance, a young man may desire to go to college, but he does not have enough money to enable him to complete a college course and must earn a part of his expenses. He has been offered a good position in a mercantile establishment, with the promise of advancement as fast as he masters the business. Shall he go to college or shall he accept the position with the mercantile house? Before he can decide he must weigh carefully the advantages and disadvantages of each course of action. Thus, a conflict of desires leads to deliberation, which may be continued for days, weeks or months, depending upon the far-reaching consequences of the decision which is involved.

*Choice.* In time, deliberation leads to the choosing of one line of action. We can see at once that the choice of either course by the young man makes the selection of the other impossible. He cannot engage in business and go to college. The opportunity to engage in business is attractive, because it enables him to earn money at once. On the other hand, its acceptance would change his life purpose, and he finally decides upon the college course.

*Action.* "Our grand business undoubtedly is, not *to see* what lies dimly in the distance, but *to do* what lies clearly at hand," says Carlyle. Choice without action falls back dead. Unless the young man acts upon his decision to go to college he will never get there. This is true of every choice; unless it leads to action it might as well not have been made. This does not, of course, apply to those choices which we are prevented from carrying out by unforeseen circumstances that are beyond our control. Moreover, the moral effect of allowing our choices to die without action is bad. There is an old proverb to the effect that the pathway to the lower regions is paved with good intentions. However true this may be, we know that the man of mere resolutions never accomplishes anything.

**Inhibition.** The highest power the will exercises is that of control. It not only starts action, but it can also arrest it. For instance, if you reach up to pluck an apple from a tree, and just as you are about to grasp the fruit discover a hornet on it, you arrest your action instantly, then withdraw your hand. Someone makes you angry and you are about to retort with sarcasm, when the "sober second thought" arrests the impulse. You will recall many similar instances if you analyze your mental processes. The function of inhibition is twofold—to prevent mental exhaustion by closing the mind, as it were, to the many impressions made upon it in daily life, and to give self-control. If we acted upon every impression brought into consciousness, both physical and mental exhaustion would soon follow. Inhibition controls our action and leads us to expend our energies upon those things that we think will be most interesting and beneficial to us. Moreover, it enables us to control our emotions. The Wise Man tells us that "he who ruleth his spirit is better than he who taketh a city." Self-control, the second function, may be considered the crowning act of the mind. True self-control is possessed by those whose intellectual forces and feelings are subservient to the will and can be so commanded as to enable each to reach just the degree of activity necessary to accomplish the purpose at hand. He who possesses self-control commands circumstances; he who lacks it is commanded by them.

Like other activities of the mind, the will is developed by exercise, and it is the part of the parent and the teacher to see that such surroundings and exercises are provided for the

child as will enable him to attain a harmonious development of all his activities. This attainment is possible only through a thoroughly-trained will.

**Suggestions.** The following suggestions will be found helpful to parents and teachers:

(1) *Attention.* Attention is the first act of will. Some authorities consider attention and will to be one. Train children in attention by eliminating distractions and rewarding long-continued, persevering effort. Vigorous games and plays will develop perseverance, but work is essential to the development of the highest type of sustained effort. Work, however, is not the same as drudgery; work has interest and motive behind it.

(2) *Imitation.* "Imitation is an instinct; suggestion is an impulse." The tendency to repeat what another does is universal, hence the power of example. Children are prone to repeat the acts, words and even the expressions of those with whom they associate. Repetition, long continued, becomes habit. It naturally follows that only correct models should be placed before children. Example does four things:

It stimulates us to do likewise.
It provides us with a standard by which we pass judgment upon conduct.
It raises or lowers our ideals of liberty.
It reveals to us our own nature.

(3) *Suggestion.* Imitation is repeating an act; suggestion is carrying out an idea. Children are particularly responsive to suggestion; hence it forms an important agency in the culture of the will. Children respond to suggestion more readily than to command, because the former admits of free exercise of the will, while the latter tends to suppress the positive element in the will. Children should be led towards the ideals we wish them to attain, not be commanded to shun those we wish them to avoid. Concerning this, James says:

There are two types of will. There are also two types of inhibition. We may call them inhibition by repression or by negation, and inhibition by substitution, respectively. The difference between them is that in the case of inhibition by repression both the inhibited idea and the inhibiting idea, the impulsive idea and the idea that negates it, remain along with each other in consciousness, producing a certain inward strain or tension there: whereas, in inhibition by substitution, the inhibiting idea supersedes altogether the idea which it inhibits, and the latter quickly vanishes from the field.

(4) *Train Children in Deliberative Action.* In deliberative action all activities of the mind should be brought to bear upon the problem under consideration. Children should be led to solve their own problems and make their own choices in so far as this can be done with safety. They will soon learn under efficient instruction to profit by their mistakes and become more careful in forming decisions. Children who are denied this privilege or shielded from this task seldom develop the power of independent and judicious decision so essential to success.

(5) *Effort.* The necessity of having children and young people act on the choices they make cannot be emphasized too strongly. Decision must be accompanied by determination and followed by action, if any benefit is to be derived from it. Those who allow their choices to evaporate become the do-nothings of society, lacking both the confidence and respect of their fellow men. Give children work within the limits of their capacity and hold them responsible for their tasks. Old and young alike should make a little gratuitous effort every day along the line of greatest resistance, and in this way accumulate strength to meet any emergencies that may arise.

(6) *Moral Training.* The culture of the will lies at the foundation of moral training. This subject is treated in the article ETHICS (which see).

(7) *Breaking the Will.* Breaking the will is not training it. Ignorant and inexperienced people often do children untold injury by compelling them to submit to cruel and unjust requirements. Children should be led gradually to make the choices we desire them to make because these will turn out best for them, and to exercise their will along right lines instead of having it suppressed by a superior force. Obedience that does not come from within is not true obedience. W.F.R.

Consult James's *Principles of Psychology;* Tichenor's *Textbook of Psychology.*

**Related Subjects.** The following articles should be read in connection with this subject:

| | |
|---|---|
| Attention | Instinct |
| Feeling | Memory |
| Habit | Perception |
| Imagination | Reason |

**WILLAMETTE,** *wil lah'met,* a river of Western Oregon, which rises in the west-central part of the state and flows northward about 200 miles into the Columbia, through a level valley about sixty miles wide. It is navigable fifteen miles, to Portland, Oregon's largest city. Albany, a city devoted to lumber industries,

and Eugene, the commercial center for agricultural produce of the upper Willamette Valley, are also on its banks.

**WILLARD,** *wil'ard,* EMMA C. HART (1787-1870), one of the earliest American workers in the campaign for women's higher education, founder of the Emma Willard School, textbook writer, and author of the words of the familiar song, *Rocked in the Cradle of the Deep.* She was born at Berlin, Conn., and at the age of sixteen began teaching in the village school. This occupation she followed for several years. After her marriage to Dr. John Willard, in 1809, she founded a girls' boarding school at Middlebury, Vt. In 1821, aided by the state, she established a seminary for girls at Waterford, N. Y., which was removed to Troy in 1823. For thirteen years after Dr. Willard's death, in 1825, his wife conducted the institution, which became known as the Emma Willard School. The proceeds from the sale of her *Journal and Letters from France and Great Britain* she donated to a school for women which she had helped to establish at Athens, Greece. Among her other writings are a *History of the United States, Last Leaves of American History, Morals for the Young* and *Treatise on the Circulation of the Blood.* In 1895, at Troy, N. Y., a statue was erected in her honor.

**WILLARD,** FRANCES ELIZABETH (1839-1898), an American educator and reformer, born at Churchville, N. Y. In 1859 she was graduated from the Northwestern Female College at Evanston, Ill., and after teaching for several years and traveling for two years in Europe and the Far East, was appointed professor of aesthetics in Northwestern University, becoming dean of the Woman's College there in 1871. Three years later she resigned that position, became secretary of the Woman's Christian Temperance Union and later its president, distinguishing herself in that capacity until her death.

MISS FRANCES WILLARD
For many years probably the most notable woman in the United States.

Miss Willard became a member of the executive committee of the Prohibition party in 1882, founded the World's Christian Temperance Union the following year, and was elected its president in 1888. In her lectures in 1876 she declared her support of woman suffrage, urging that through the ballot women would win protection against the evils of drink. She visited England in 1892 as the guest of the temperance reformer, Lady Henry Somerset, and during her stay addressed what is said to have been the largest audience ever assembled in mass meeting at Exeter Hall.

During her life Miss Willard did more for the cause of temperance than probably any other person of her time, through the influence of her rare personality, depth of sympathy and sincerity. She edited the Chicago *Post and Mail* and the *Union Signal,* the latter the official organ of the temperance movement. Her writings are *Nineteen Beautiful Years, Woman and Temperance, Glimpses of Fifty Years* and *A Great Mother.* With Mary A. Livermore she edited *A Woman of the Century.*

Consult Gordon's *The Beautiful Life of Frances Willard.*

**WILLIAM,** the name borne by four of the rulers of England, the first of whom was the conqueror of the island.

**William I,** THE CONQUEROR (1027-1087), the first Norman king of England, son of Duke Robert II of Normandy. He inherited the duchy of Normandy at the age of eight, and until he was old enough to govern it in person, his territory was in wild disorder. At the age of twenty he put down a serious revolt, and thenceforward ruled with an iron hand. His experience in Normandy guided him when he ascended the English throne.

*Invasion of England.* In 1066 William invaded England to make himself king. Although to-day an enterprise such as his would be considered as piracy, William justified his action on several grounds and had the encouragement of the Pope. When the Norman nobles feared he would not be able to cross the English Channel with enough men to conquer, he said, "It is the courage of warriors rather than their numbers that determines the result of combats." Estimates of the number of men who accompanied him vary from 14,000 to 60,000. The English king, Harold, prepared to resist the Normans, but was drawn away by a Norwegian attack on his other coasts, and William's expedition landed without opposition. Harold returned and fought the Battle of Hastings, which resulted in victory for the invaders.

*Norman Conquest.* William spent several years subduing the island. He hesitated at no act which he thought would increase his power. He took all the land from its English owners, whether they had resisted him or not, and gave

DOMAIN OF WILLIAM THE CONQUEROR

it to about twenty thousand of his Norman followers, even to his menial servants. But he saw that many of the Saxon institutions would help him govern, and these he retained. In 1072 he marched against the king of Scotland, who had been encouraging English rebels, and forced him to swear allegiance. Instead of dividing England into powerful duchies, according to the usual feudal system, William required all the landholders to swear direct loyalty to the Crown. In this way he put down anarchy and made the people united in their allegiance to the Crown. To get knowledge helpful in controlling his subjects he ordered the preparation of the Domesday Book, described elsewhere in these volumes.

Though harsh in his measures, and placing the unity of his kingdom above all moral considerations, William tried to be fair, and soon he gained the respect of the people. In an age of wickedness he was a man of clean life, temperance and piety. He was on the whole a wise ruler, and the great French historian Guizot says, "England owes her liberties to having been conquered by the Normans."

Consult Green's *Conquest of England;* Freeman's *William the Conqueror;* Stenton's *William the Conqueror.*

**Related Subjects.** The events of these reigns will be more fully understood if the following articles are consulted:

| | |
|---|---|
| Boyne, Battle of the | Hastings, Battle of |
| Domesday Book | James, subhead *James II* |
| England, subhead *England Becomes Danish, then Norman* | Louis, subhead *Louis XIV* |
| Feudal System | Normans |
| Harold, subhead *Harold II* | Rotten Boroughs |

**William II** (about 1056-1100), called *Rufus,* meaning *Red,* because of his florid face, was the son of William I, but was a king who is never praised by historians. Though the chroniclers of his time, the monks, were prejudiced because of his contempt for the Church and exaggerate his failings, there is sufficient evidence that he was an oppressive and unscrupulous monarch. He had most of the ability and determination of his father, the Conqueror, without the latter's restraint of conscience. One who lived in his times says, "He feared God but little, man not at all."

Rufus became king in 1087. In the first year of his reign the barons revolted. By pledging reforms he secured the support of the people, defeated the nobles, and then ignored his promises. He refused to name a successor to the deceased Archbishop of Canterbury, and seized the revenues of the see. Later, frightened by illness, he appointed Anselm archbishop, but afterwards the two quarreled almost continually. William secured Normandy from his brother Robert by foreclosing a loan, and extended its borders by conquest. He also gained territory from the kings of Scotland.

**William III** (1650-1702), king of Great Britain and Ireland, better known as WILLIAM OF ORANGE, who gained the English throne in the "Glorious Revolution" of 1688. His life purpose was the destruction of the power of the French king, Louis XIV. When, in 1672, Louis invaded Holland, William, whose family had gained fame in the defense of its country, was chosen as stadtholder, or ruler. By opening the dykes he checked the French advance. For the rest of his life he was engaged in almost continuous wars with Louis. Realizing the strength of the opposition to James II, the last Roman Catholic king of England, he attempted to win that nation's support. Certain of James's enemies sent an invitation to William, the "Champion of Protestantism," and in 1688 he landed in England with an army of 14,000. As James's oldest daughter, a Protestant, was William's

wife, and the king's only son, a newborn baby, was to become a Catholic, it was natural for the Protestants of England to hail William, himself a grandson of Charles I, as a deliverer.

In England not a drop of blood was shed in the revolution. James escaped to France, took a French army to Ireland, and with his Irish allies was defeated by William in the Battle of the Boyne, in 1690. A long persecution of Irish Catholics followed. The Protestants of Ulster, who supported William, are called *Orangemen* to this day. In Scotland there were several battles and a massacre, which, though probably not authorized by William, may have had his approval.

William became the best English sovereign since Elizabeth, but was never popular. His foreign ways were not understood, and in turn he failed to comprehend the English political system. To further his projects against Louis he needed the support of Parliament, and often sacrificed his personal feelings to keep its good will. Rather than arouse opposition, he allowed Parliament seriously to curtail the king's powers. Though a good soldier, he was a better diplomat. In 1692 his admirals destroyed the French sea power, and after prolonged land warfare he forced Louis to acknowledge him in 1697 as the rightful king of England. In 1701 he formed an alliance with nearly all Europe against Louis, but did not live to fight in the war which followed. The Bank of England was established during his reign, to finance the wars.

**William IV** (1765-1837), "the Sailor King" of Great Britain and Ireland, was a genial and conscientious man, but an irresolute ruler. He succeeded his brother, George IV, in 1830. Though three of the greatest of English reforms—abolition of rotten boroughs (see page 5089), abolition of slavery in the colonies and factory reform—were made in his reign, they were due to the energy of his ministers in carrying out the demands of the people. The great Reform Bill of 1832, which ended the rotton boroughs and added half a million voters to the lists, was passed only after a struggle between king and Cabinet. William was succeeded by his niece, the great Queen Victoria. C.H.H.

**WILLIAM,** in German, WILHELM, the name of two German emperors, the latter the last of the Hohenzollern monarchs.

**William I** (1797-1888), the first emperor of modern Germany, though overshadowed in his reign by Bismarck and Moltke, was a sovereign of unusual force of character, and in private life, simple, manly and upright. The second son of Frederick William III, king of Prussia, he received military training from his earliest years, and in 1814-1815 fought as a captain under Napoleon. In the revolutions of 1848 he achieved unpopularity by frank opposition to constitutional reform. As general he put down the risings of 1849. In 1857 he became regent for his brother, Frederick William IV, and in 1861 king of Prussia. Though a firm believer in the divine right of kings, with shrewd common sense he made concessions necessary to gain public confidence. He chose advisers with sagacity. He was reluctant to declare wars, but, trusting firmly in the destiny of Prussia, attained popularity by ability as a military leader in the wars with Denmark (1864), with Austria (1866) and with France (1870). Through Bismarck's efforts William was crowned German emperor at Versailles, near Paris, in 1871. The rest of the reign was spent in consolidating the Empire.

WILLIAM I
King of Prussia, and first emperor of Germany.

Consult Forbes's *Life of Emperor William.*

**Related Subjects.** The reader may refer to the following articles in this connection:

Bismarck-Schönhausen
Divine Right of Kings
Franco-German War
Germany, subhead *The Birth of a Nation*
Moltke, Count von
Prussia, subtitle *Government and History*
Seven Weeks' War

**William II** (in German WILHELM II), FRIEDRICH WILHELM VICTOR (1859- ), until November 10, 1918, king of Prussia and by virtue of this office the ruler of the German Empire, with the title of emperor. He was popularly called the *kaiser* (see CAESAR). From his accession to the throne, June 15, 1888, at the age of twenty-nine, he was the central figure in Europe, and nearly all other parts of the world have felt the influence of his personality. He was truly called for many years the "war lord of Europe;" however, he announced himself on every suitable occasion as an apostle of peace.

This man has combined in his life strange contradictions. He is deeply religious, but is inordinately ambitious; he honestly endeavored to advance the Empire in commerce, in education, in art and in letters, and he encouraged

every means to promote the prosperity of the Fatherland, yet he fastened upon the German states the severest military system that has ever been known, and it destroyed him. In 1914 the belief prevailed that he might have

FOR THIRTY YEARS WILLIAM II

With his Kultur and his "Gott" he could not dominate the world.

prevented the War of the Nations, because Germany's ally, Austria-Hungary, could not have ventured upon it alone. William insisted that the struggle was forced upon him. From the testimony of eminent Germans after 1914 the world has learned that Germany forced the war upon the world. The emperor, in the light of events, could not escape the harsh judgment of mankind; he was branded as the leader in a murderous, imperialistic design.

William II was born January 27, 1859, the son of Frederick III and the grandson of William I, who with the genius of Bismarck erected the German Empire upon the foundations which existed in the North German Confederation. His father ruled only three months, but throughout his public career, both before and after he became emperor, he made known his desire for a truly parliamentary government. He was saddened by the autocratic tendencies of his eldest son William, who as crown prince had shown himself domineering and headstrong.

**Dismisses Bismarck.** William II reached the throne while Bismarck was yet Chancellor. The great German had been placed in that post by William's grandfather and had been retained by his father; he was the idol of the people. The emperor lost no time in letting it be understood that he ruled by divine right. An early statement made his mission clear: "It is a tradition of our House [Hohenzollern] to consider ourselves as designed by God to govern the peoples over which it is given us to reign." His grandfather, William I, on ascending the throne in 1861, had declared that he ruled "by the favor of God and of no one else." William II venerated his grandfather, and it is on record that he despised the opposite attitude of his liberal, cultivated father.

Friction at once developed between the "Iron Chancellor" and the young monarch. The former had been the virtual ruler of the Empire which he had done so much to create, and the new emperor grew more and more restive under the dominating will of the older man. In March, 1890, a crisis in their relations was reached when the Chancellor declared that the emperor should not act directly through any of his Ministers, but only through the Chancellor. Bismarck's resignation was demanded because of this attitude, and he retired from public life. The emperor wrote a letter to Bismarck regretting the necessity of the act, but declaring it "ordained of God."

Between that date and November, 1918, seven men held the post of Chancellor; they were Caprivi, from 1890 to 1894; Hohenlohe, 1894 to 1900; Von Bülow, 1900 to 1909; Bethmann-Hollweg, 1909 to July, 1917; Michaelis, from July to November, 1917, Von Hertling and Prince Maximilian succeeding. Each in turn proclaimed his responsibility to the emperor alone.

**Development within the Empire.** Upon his accession Emperor William found Germany largely agricultural; he turned it to a remarkable degree into an industrial country, and it naturally followed that political considerations began to occupy the minds of the people. Capital and labor problems disturbed the nation, and because they were not handled wisely Germany within the space of a few years became the leading Socialist community of Europe. The emperor had no patience with the increasing power of the Socialists, and as he saw them grow strong enough to elect over a hundred members of the Reichstag and consequently able to embarrass his program he referred to them as "a horde of men unworthy to bear the name of Germans."

He fostered the means of elementary education, but was sorely disappointed in the schools,

saying at one time that had they done what was expected of them they would have taught against socialistic doctrines. Because of the growing power of this group of his subjects he resolutely refused to entertain propositions looking to reform in the elections to the Reichstag. When the War of the Nations began in 1914 the Socialists supported the government for nearly three years without division, but in 1917 they forced the resignation of Chancellor Michaelis because he failed to respond to their peace proposals of "no indemnities and no annexations."

**Attitude towards Foreign Affairs.** When the German Empire was formed Germany held little foreign territory. It was the desire of William II to win "a place in the sun" for his country, therefore he encouraged a vast colonial policy. Near home he secured closer relations with Turkey, with prospects through such coöperation of Germanizing parts of Asia Minor and gradually extending German influence southeastward through the continent. As early as 1890 he had secured title to German Southwest Africa, a country as large as the entire old Northwest Territory of the United States and the state of Minnesota. Later diplomacy gave him a foothold in China and in the Pacific Islands—many advantageous points for coaling and supply stations. He endeavored to purchase the Danish West Indies from Denmark, but the United States succeeded in keeping them out of his hands. They are now the Virgin Islands of the United States.

The colonial empire was extinguished, for the time being, at least, by Germany's enemies in the War of the Nations.

**Growth of Militarism.** Vast colonial possessions cannot be protected without a navy. Emperor William showed great energy in organizing a naval program, which resulted in twenty years in building up the most powerful navy in the world excepting that of Great Britain. On land he gave as careful attention to the military arm of his government, and for years it was well understood that the armies of Germany were more powerful than those of any other nation. The exact extent of the military resources at the emperor's command was little guessed until the summer of 1914.

**His Accomplishments.** William II was a versatile monarch. Before he suffered an affliction which withered one arm he was a pianist of no mean order, and he composed considerable music. He posed as an artist; he can make a good speech when occasion requires. Religion is deeply impressed upon his life, and he made frequent reference to his working with God; he claimed not to be bigoted in his beliefs, but to hold a notable tolerance for other religions, which have always been well represented in the country.

In 1881 William II, then crown prince, married Princess Auguste Victoria, of Schleswig-Holstein. Six sons and one daughter have been born to them. The eldest was the crown prince, Frederick William (born 1882); his glory ended with Germany's defeat. The other sons are Eitel Frederick (1883), Adalbert (1884), August Wilhelm (1887), Oscar (1888) and Joachim (1890). The daughter is Victoria Luise (born 1892).

William's mother was Victoria, princess royal of Great Britain, hence he is a cousin of King George V of England, and he was also a cousin of the former Czar Nicholas of Russia.

The military power of Germany was broken in 1918, and its creator was shorn of power. On November 10 he sought refuge in Holland, and on November 28 he renounced the throne forever.

E.D.F.

**Related Subjects.** In connection with this discussion the reader may refer to the following articles in these volumes:

| | |
|---|---|
| Bethmann-Hollweg, Theobald Theodore von | Germany, subhead *The Reign of William II* |
| Bismarck-Schönhausen | Socialism |
| | War of the Nations |

**WILLIAM I,** Prince of Orange, Count of Nassau (1533-1584), also popularly known as William the Silent, is the best-loved character in Dutch history. His parents were Lutherans, but he was brought up a Roman Catholic at the court of Emperor Charles V. When very young he inspired such affectionate trust in the emperor that he was put in command of the army of the Netherlands and was charged with delicate diplomatic errands; and although always frank and charming, he was so discreet that he earned the title of the *Silent*. Charles recommended William earnestly to his son and successor, Philip II, but from the first the two were antagonistic. William returned to Lutheranism, but preserved an unswerving tolerance, astounding in those days of cruelty and religious persecution. Philip, on the contrary, was a devoted but intolerant Catholic. William fought the Inquisition in Holland, refused to appear in the council of the Duke of Alva, and defied Spain by invading Brabant. In 1576 he persuaded the Northern and Southern provinces to unite and expel the Spaniards, and although the Southern provinces

soon broke away from the union, the seven provinces of the North formed a league in 1579, the beginning of the Dutch Republic. Five times William's life was attempted, and in 1584 he was assassinated by a fanatic. See NETHERLANDS, THE, subtitle *History*.

Consult Harrison's *William the Silent;* Motley's *Rise of the Dutch Republic.*

**WILLIAM AND MARY COLLEGE,** a school for men, situated at Williamsburg, Va. Next to Harvard it is the oldest institution of higher learning in the United States, having been chartered by King William and Queen Mary

MAIN HALL
Designed by Sir Christopher Wren.

of England, in 1693. While never a large school, it has had a notable history. Among its graduates are three United States Presidents—Jefferson, Monroe and Tyler; Chief Justice John Marshall, of the United States Supreme Court, and a host of other prominent men, including army officers, Senators, foreign ministers, governors, college presidents and other educators.

During the Revolutionary War and the War of Secession the college buildings were used as barracks. After the Revolution George Washington was chancellor from 1788 to 1799. Nearly the entire student body enlisted for service in the Confederate army during the War of Secession, and at that time the school was closed. After a long struggle it reopened and slowly regained its old prestige. In spite of the hard fortunes of war, several fires and age, the walls of Main Hall, designed by the famous British architect, Sir Christopher Wren, are still standing.

The Phi Beta Kappa Society (see page 4619) was organized at William and Mary in 1776, and there also originated the elective system of studies, a result of the influence of Jefferson, and the honor system. Since 1865 the work offered has been strictly academic, with special emphasis upon courses in education which prepare men to be teachers. The college is supported by the state of Virginia and by income from endowments. The student enrolment is 240, and the faculty numbers about twenty. There are 30,000 volumes in the library.

**WIL'LIAMS,** JOHN SHARP (1854- ), a leader in Democratic politics and United States Senator from Mississippi for the term 1911-1917, to which office he was elected as a reward for eighteen years' service in the House of Representatives. He was born at Memphis, Tenn., but passed his boyhood in Yazoo County, Miss. His education was obtained at various schools in the South, among them the Kentucky Military Institute, the University of the South and the University of Virginia. He was also a student at the University of Heidelberg, Germany. Williams was admitted to the bar in Tennessee, and established a practice in Yazoo City, Miss., where part of his energies were devoted to the management of his plantation. He early became a prominent figure in national politics.

**WILLIAMS,** ROGER (1604-1683), an American colonist and the founder of Rhode Island, was born in Wales, and educated in Charter House School, London, and Pembroke College, Cambridge University. While still a college student he became bitterly opposed to the ceremonies of the Episcopal Church, and as a protest joined the Puritans. He emigrated to Massachusetts in 1631 and was immediately offered the position of pastor in the Boston church, but declined on the ground that this congregation had not publicly announced its separation from the Church of England. He then accepted pastoral work in the church at Salem, Mass., which had made such a public announcement as he demanded, but the enraged Bostonians soon caused his removal.

Plymouth next invited him to serve as pastor, and for two years he preached with great zeal, meanwhile earning his living by work as carpenter and farmer. In August, 1633, he again began to preach in Salem, but in 1635 was convicted of heresy by the colony's general court. Among the charges were his declarations that the Indians, even though heathen, should have been paid for their lands, that a wicked person should not be compelled to worship God, and that men should have full liberty of conscience.

In January, 1636, he fled to the site of the present city of Providence, R. I., where he founded a settlement that became a refuge for

the persecuted of several nations. The Massachusetts colonists opposed him in many ways, and upon their denial of his right to establish such a haven he went to England in 1743 and secured a charter early in the next year. He held numerous offices in Rhode Island until 1677, and was so careful in his dealings with the Indians that his only equal in their confidence was William Penn. He was a keen, vigorous writer, and his pamphlets against the New England Puritans, such as *The Bloudy Tenent of Persecution for Cause of Conscience Discussed* and *The Bloudy Tenent Made Yet More Bloudy by Mr. Cotton's Endeavor to Wash It White in the Blood of the Lambe,* are sharp and sarcastic specimens of argument. Williams died at Providence and was buried there. A statue in his honor stands in the Capitol at Washington.

Consult Carpenter's *Roger Williams;* Knowles' *Memoirs of Roger Williams.*

**WILLIAMS COLLEGE,** a school for men, located at Williamstown, Mass. It grew out of a "free school" founded by Colonel Ephraim Williams, who was killed in ambush at Lake George in 1755. The funds were allowed to accumulate until 1793, when the school was chartered and opened. Its greatest period of development was during the presidency of Mark Hopkins (1836-1872), a Williams graduate and one of the ablest educators of his century. To his splendid influence is largely due the high rank of the college. During his administration two famous Americans, President Garfield and William Cullen Bryant, were students at Williams.

To this school is due the organization of the oldest foreign missionary society in the United States (1806), the earliest alumni association (1817), a natural history society (1825), an antislavery society (1826) and a scientific expedition to Labrador (1835). The course of study is arranged in what is known as the group system. There are five groups, and the purpose is "to concentrate part of the student's work in one well-defined field, and to distribute another part among different subjects." The faculty numbers about sixty, and the student enrolment exceeds 500. The library contains over 85,600 volumes.

**WILLIAMSPORT,** *wil'yumz port,* Pa., the county seat of Lycoming County, is an important lumber market, situated north and east of the center of the state, ninety-four miles northwest of Harrisburg. It has a beautiful site in the Alleghany Mountains, on the West Branch of the Susquehanna River, and enjoys some fame as a summer resort. The city is served by the New York Central, the Pennsylvania and the Philadelphia & Reading railroads, and by interurban lines. In 1910 the population was 31,860; it was 33,809 in 1916 (Federal estimate).

Williamsport has Dickinson Seminary, a Federal building completed in 1885 at a cost of $250,000, a city hall, Masonic Temple, the James V. Brown Library, built by a bequest of $400,000, and two hospitals. Brandon Park (forty-five acres) is an attractive city playground, and in the vicinity are Starr Island and Sylvan Dell. In addition to the lumber industries, Williamsport has foundries, steel mills, iron plants, silk mills, furniture factories, dye works and manufactories of glass and mirrors, woodworking machinery, pumps, valves and motors. Coal mining is of some importance.

The town was founded in 1795 by Michael Ross. It became the county seat the year of its founding, was incorporated as a borough in 1806 and became a city in 1866. In 1913 the commission plan of government was adopted.

**WILLIMANTIC,** *wil i man'tik,* Conn., known locally as the *Thread City,* is situated in Windham County, of which it is one of the county seats, in the eastern part of the state. It is about midway between the northern and southern state borders, where the waters of the Willimantic and Natchaug rivers meet. Hartford, the state capital, is thirty-two miles northwest, and Providence is fifty-nine miles northeast. Transportation is provided by the New York, New Haven & Hartford and the Central Vermont railways; electric lines operate to towns northwest and southeast. Willimantic was incorporated as a borough in 1833 and was chartered as a city in 1893. In 1910 the population was 11,230; in 1916 it was 12,670 (Federal estimate). French-Canadians and Irish predominate in the foreign element.

Besides its thread factories, which employ about 2,800 people, Willimantic has large plants for making cotton prints and twills, and it is becoming noted for its manufacture of silk. Willimantic has a state armory, a state normal school, a high school, built in 1914 at a cost of $175,000, a public library with about 6,000 volumes, and Dunham Hall Library. The State Agricultural College is located a few miles north of the city. W.C.N.

**WILLIS,** *wil'is,* Nathaniel Parker (1806-1867), an American writer, born in Portland, Maine, the son of the founder of the *Youth's*

*Companion.* While at Yale, where he was graduated, he wrote some religious verse which was much admired, and which appeared in a paper then edited by his father. He edited two annuals for S. G. Goodrich and conducted the *American Monthly Magazine* till its union with the New York *Mirror,* in which he became associated with George P. Morris. For six years he traveled in Europe, nominally as an attaché of the United States embassy at Paris, but really as a correspondent of the *Mirror.* He met many famous writers, and in *Pencillings by the Way* wrote of them in a rather unpleasantly personal manner. He married in England, and returning to America, wrote three successful plays, and conducted, one after another, three short-lived journals. His wife died in 1845, but he soon married again. With Morris, he founded the weekly *Home Journal,* a fairly successful paper, on which, despite illness, he worked steadily until his death. His many books include sketches of society and travel, poetry and stories. His style is easy and graceful, but his work shows too little thought to be enduring. Most widely known of his writings is his poem on *The Death of Absalom.*

**WILLISON,** *wil'i son,* Sir John Stephen (1856- ), a native of the Canadian province of Ontario, born in Stanley, Huron County. At the outset of his career he turned to journalism, and finding himself adapted to it he rejected all overtures in the direction of other occupations. His knowledge of men and of politics was broadened by service for a number of years as parliamentary reporter for the Toronto *Globe;* in 1890 he had risen to the post of editor-in-chief of that paper.

After twelve years' service on the *Globe,* in 1902 he became editor of the Toronto *News,* and in this position some of his most important work has been done. In 1911 he was able to contribute to the defeat of the reciprocity treaty with the United States, and he is credited with influencing public opinion leading to the downfall of the Laurier Ministry, which followed shortly afterwards.

In 1910 Willison became Canadian correspondent of the London *Times,* and in 1913 he was knighted by King George V. His education was received in the public schools, but in recognition of his worth he was given the honorary degree of LL.D. by Queen's College. He has written several books, among them being *The Railway Question in Canada, Lessons from the Old World, Sir Wilfrid Laurier and the Liberal Party, Anglo-Saxon Amity* and *Canada and the United States.*

**WILL-O'-THE-WISP.** See Ignis Fatuus.

**WILLOW,** *wil'o,* a family of trees and shrubs common in the cold and temperate regions of both hemispheres. There are more than 150 species, ranging from tiny plants one inch in height, found on the European mountains and

THE WILLOW

Characteristic form of the tree, at left. At the right appear staminate and pistillate flowers and leaf cluster, showing the form of the leaves.

in Arctic regions, to the white, or Huntingdon, willow, growing eighty feet high. Representatives of the family have been discovered even in the tropical regions of Australia and the South Sea Islands.

The willow is a tree of rapid growth and thrives best in damp ground or along streams. Early in the spring, before the budding of the slender leaves, the silken, downy catkins appear. These bear the flowers and are popularly known as pussy willows. The shrubs and trees are reproduced by the rooting of twigs or by little seeds, which, sailing on downy parachutes, are distributed over wide areas by the wind.

Among the most common varieties growing in America are the *yellow* and *black* willows, the tall *white* willow, the *crack* willow, the real *pussy-willow* shrub and the *weeping* willow. The latter species is a native of China, and there are many varieties cultivated throughout America and Europe as ornamental trees. It is also known as *Napoleon's* willow, because his tomb at Saint Helena was shaded by one of the species.

**Economic Value.** Few trees have more varied uses than the willow. Because of its rapid growth it is used as a hedge and shade tree, and owing to the immense quantities of water absorbed by its roots it is often planted to dry out damp soil or to improve sanitation. The

wood is white, soft and light, and is more durable in water than is any other timber. It is therefore a valuable material for steamboat paddles and other objects used in water. It is employed extensively for cabinet work, base-ball and cricket bats, hoe handles and many small articles, and is used in the manufacture of paper pulp and a fine charcoal. The bark contains a large amount of tannin and is a valuable tanning material. It is also the source of a medicinal extract known as salicin. A perfume is distilled from the flowers of the Egyptian willow.

However, the most important industrial use of the willow is in the making of wickerwork and baskets from the young shoots, or osiers. In Western New York, Southeastern Michigan and in several other localities in lesser degree there are sections devoted to osier culture; in England and the low tide-flooded regions of Holland, Belgium and France, it is an extensive industry. E.B.P.

**WIL'MINGTON,** Del., the first city in the state in population, commerce and industry, and the county seat of New Castle County, is situated in the extreme northern part of the state, on the Delaware River at the point where it receives the waters of the Brandywine and Christiana creeks. Philadelphia is twenty-seven miles northeast, and Baltimore is sixty-nine miles southwest. Railroad transportation is provided by the Pennsylvania and the Baltimore & Ohio railroads, and by electric lines which operate in various directions. Steamers communicate regularly with several Delaware Bay and Atlantic ports, and two passenger and freight steamer lines ply between Philadelphia and Wilmington daily. The population increased from 87,411 in 1910 to 94,265 (Federal estimate) in 1916. Irish, Italians and Poles predominate in the foreign element.

Wilmington is built on elevated ground between the Brandywine and Christiana creeks, and extends about four miles back from the Delaware River, to which the city has not yet been completely built. The river has a thirty-five foot channel to the Atlantic Ocean, and at this point is three miles wide. The park reservations of the city comprise about 540 acres, Brandywine and Rockford parks being the largest and most attractive.

**Buildings and Institutions.** Nearly all of the houses are built of brick or stone. A Federal building, erected in 1897, a city hall, a county courthouse, which cost $1,500,000, and the Du-Pont building are especially noteworthy. Wilmington has a large number of benevolent institutions, among which are a home for friendless children, Saint Peter's Orphanage, Saint Joseph's Home for colored children, homes for aged men and women and three hospitals. The state hospital for the insane and the county almshouse are in the vicinity. The city is prominent in its territory as an educational center, having Goldey College, Ursuline Academy, Hebbs School, Wilmington Friends' School, Wilmington Military Academy, a business college, the public library and the Public Historical Society and Law Association libraries. The most noted of several churches is the Old Swedes' Church, erected in 1698.

**Industry.** The leather industry is the most important factor in the industrial life of Wilmington; there are fifteen factories engaged in leather tanning. The passenger-car factories and the cotton dyeing, bleaching and finishing plants are classed with the largest of their kind in the United States. There are also ship-building yards, foundries and machine shops, tobacco factories, paper mills and more than 150 other manufacturing establishments. About 20,000 people are employed in the powder plant outside of the city limits; it was established by Pierre Samuel DuPont and his sons in 1801. The first iron sailing boat made in the United States was built at Wilmington in 1854.

**History.** The town was founded in 1638 by Swedes under Peter Minuit, on the site of the Indian village called Minquas. They changed the name to Christinaham. Again the name was changed to Fort Altena by the Dutch, who purchased the place from the Swedes in 1655. It became a possession of the English in 1664, and passed into the control of William Penn. The name was changed to Willingstown in 1731, in honor of Thomas Willing, who planned the town, and later it was changed to Wilmington. In 1739 the place was incorporated as a borough; in 1832, chartered as a city. J.S.C.

Consult Powell's *Historic Towns of the Middle States.*

**WILMINGTON,** N. C., the county seat of New Hanover County and an important seaport for North and South Carolina, is situated on the left bank of Cape Fear River, about thirty miles from the sea. Raleigh, the state capital, is 110 miles northwest. Steamers ply weekly between Wilmington, New York and Baltimore, and inland transportation is provided by the Atlantic Coast Line and the Seaboard Air Line railroads. In 1910 the popula-

tion was 25,748; in 1916 it was 29,892 (Federal estimate).

The Federal government has in recent years expended more than $1,000,000 in improving the harbor here and in canalizing the river, to provide navigation to Fayetteville, 115 miles above Wilmington. As a commercial and industrial center, the city has a high rank in its territory. It has extensive lumber interests, eight lumber and timber establishments being in operation here; besides these, there are plants for making turpentine, resin, confectionery, foundry and machine-shop products, cotton products and chemicals. The chief exports are cotton, rice, naval supplies, lumber, turpentine and truck-garden products.

Wilmington has a county courthouse, a city hall, a post office, a United States Marine Hospital, a Masonic Temple, a number of modern bank and office buildings and James Walker Memorial and the city hospitals. The city also has the county house of correction, the county home, Catherine Kennedy Home for aged women, and other charitable organizations. Saint Mary's Cathedral and First Baptist churches are worthy of note. For higher education there are Cape Fear Academy, Gregory Normal School, for colored pupils, Academy of the Incarnation, Alderman's School and a public library. Wrightsville Beach, a noted summer resort, is on an island, eight miles east.

Wilmington is the outgrowth of a settlement founded in 1730. Its original name of New Liverpool was later changed to Newton, and the present name was adopted in 1739, at the time of the town's incorporation, in honor of Spencer Compton, Earl of Wilmington. In 1744 it became the capital of the province. In 1765 the town firmly opposed British authority and offered the first armed resistance to the Stamp Act, when it refused to permit a British man-of-war to land a quantity of stamps. An early victory of American arms in the Revolutionary War occurred at Mŏore's Creek Bridge, sixteen miles above this point, on February 27, 1776. Wilmington was the headquarters of Cornwallis in 1781 and 1782. During the War of Secession it was a noted port for blockade runners, being the gateway between the South and foreign nations, and it was strongly fortified by the Confederates. In February, 1865, they were forced by General Schofield to abandon the city. In 1866 Wilmington received its city charter. J.S.C.

Consult Powell's *Historic Towns of the Southern States.*

**WIL'MOT,** LEMUEL A. (1809-1878), a Canadian statesman, born in New Brunswick, in Sunbury County, and all his life identified with the interests of that province. He was graduated from the University of King's College, Fredericton, admitted to the bar at the age of twenty-three, and in 1834, when twenty-five years old, was elected to the legislature. Because of his untiring efforts in behalf of responsible government he was sent to England in 1836 to plead for popular control of the provincial Crown lands, and this he secured. In 1848 Wilmot became premier of New Brunswick, under its first responsible government, but he resigned this post in 1851 to accept appointment to the provincial supreme court.

He worked to secure confederation for Canada, and upon organization of the Dominion he became the first lieutenant-governor of New Brunswick.

**WILMOT PROVISO,** *pro vi'zo,* an amendment offered in the United States Congress on August 9, 1846, to a bill appropriating $2,000,000 for the purchase of territory from Mexico. The amendment, presented by David Wilmot, a Democratic representative from Pennsylvania, was to the effect that "neither slavery nor involuntary servitude shall ever exist in any part of said territory, except for crime, whereof the party shall first be duly convicted." The House adopted the amendment. It was sent to the Senate, and was under debate at the time fixed for adjournment, but Wilmot again introduced it in the next session, in 1847, and a fierce contest began. The House finally passed the measure on February 15, but the amendment was rejected by the Senate. The question resulted in a breach between the Northern and Southern Democrats, and brought definitely before the country the question of the status of the new territory.

**David Wilmot** (1814-1868), author of the amendment, was born in Bethany, Wayne County, Pa. He studied law, was admitted to the bar in Wilkes-Barre, Pa., in 1834, and began practice in Towanda. He first came into public notice through his ardent support of Martin Van Buren in the Presidential campaign of 1836, and was subsequently sent to Congress as a Democrat, serving from 1845 to 1851. From 1853 to 1861 he was judge of the thirteenth district of Pennsylvania. Later he joined the Republican party, and in 1857 was defeated as a candidate for governor of the state. In 1861 he was elected to the United States Senate, in place of Simon Cameron. He

was appointed judge of the Court of Claims in 1863 by President Lincoln, and died while holding that office.

Consult Von Holst's *Constitutional and Political History of the United States.*

**WILSON,** Augusta Jane (Evans) (1835-1909), an American novelist who had great popularity in her day. Her stories, though interestingly written, are overemotional and weakly sentimental, and have failed to hold the place they once had in the affection of the public. She was born in Columbus, Ga., and was brought up in Texas and Alabama. Her first novel, *Inez, A Tale of the Alamo,* was published when she was seventeen years old. Others that followed included *Beulah, Macaria, Saint Elmo* (the best known), *Infelice* and *Devota.*

**WILSON,** Sir Daniel (1816-1892), a Scotch scientist who became identified with education in Canada through appointment to a professorship in the University of Toronto. He was born at Edinburgh and was graduated from the University of Edinburgh, his work there bringing him favorable mention in the field of archaeology. His first book, *Edinburgh in the Olden Time,* established him as a scientist, and soon appeared *Archaeological and Prehistoric Annals of Scotland.*

In 1853 he was induced to accept the chair of history and English literature at Toronto, and at once he took a prominent part in the affairs of that city. He was editor of the *Journal* of the Canadian Institute in 1854, and six years later was elected president of the organization. In 1885 he was president of the Royal Society of Canada, and three years later he was knighted.

Meanwhile, in 1881, he had been chosen president of Toronto University, and he retained the post during the remainder of his life.

**WILSON,** Henry (1812-1875), Vice-President of the United States from 1873 to 1875, and at one time among the ablest orators in the country. His name was originally Jeremiah Jones Colbaith, but he changed it when he attained his majority. He was born at Farmington, N. H., of poor parents, and earned his education by working as a farm hand and shoemaker. He became a shoe manufacturer at Natick, Mass., a fact which led to his being nicknamed "the Natick cobbler" when he entered political life. In 1840 he began to attract attention as a campaign speaker, and the same year he was elected to the lower house of the Massachusetts legislature; later he served two terms as state senator. He established a Free-Soil paper in 1848, and from 1855 to 1873 served as United States Senator. At the outbreak of the War of Secession Wilson was made chairman of the military committee of the Senate. In 1872 he was nominated for the Vice-Presidency by the Republican party, on the ticket with Grant, and was elected. He died in 1875, before his term of office expired.

**WILSON,** James (1835- ), an American Secretary of Agriculture who held his position for sixteen years (1897-1913), a longer term than any other Cabinet member has ever served. Born in Ayrshire, Scotland, in 1835, he emigrated to America seventeen years later with his parents, and settled in Connecticut. In 1855 the family moved to Iowa, where James attended Iowa College and later engaged in farming. For three terms he was a member of the state assembly, during one of which he was speaker; and at two different times, from 1873 to 1877, and from 1883 to 1885, he served in Congress. In 1870 Wilson became regent of the University of Iowa, holding that post for four years. Later he acted as director of the Agricultural Experiment Station, and was professor of agriculture at the Iowa Agricultural College. In 1897, under President McKinley, he became Secretary of Agriculture, a post which he continued to hold in the Cabinets of Presidents Roosevelt and Taft.

For a review of the accomplishments of his progressive administration, consult the *Year Book of the Department of Agriculture* for 1912.

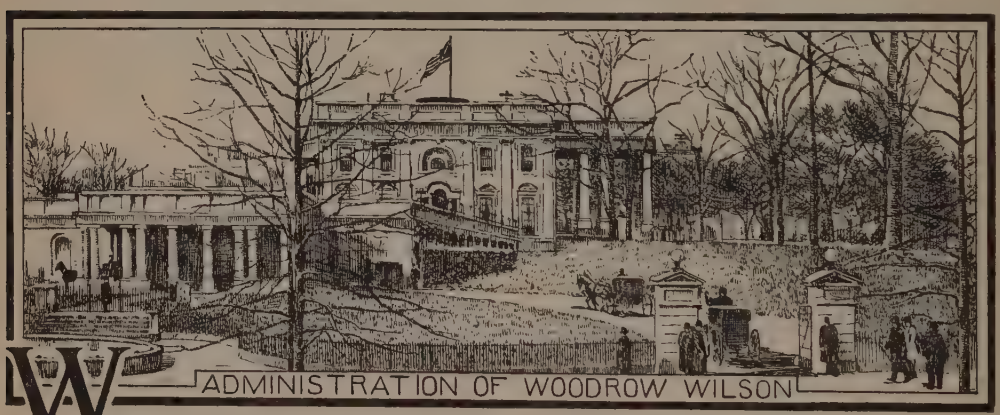
**WILSON,** John (1785-1854), an essayist and poet, widely known under the pen name of Christopher North, was born at Paisley, Scotland. He entered the University of Glasgow at the age of twelve and during six years' attendance gained several honors for work in classic literature. At Magdalen College, Oxford, which he entered in 1803, he again proved a brilliant student. He inherited a large fortune from his father, but a dishonest uncle dissipated this by reckless speculations, and Wilson moved to Edinburgh, where he joined Lockhart, the son-in-law of Sir Walter Scott, in writing for *Blackwood's Magazine.*

In 1822 he began the famous series of essays, or table talks, entitled *Noctes Ambrosianae,* which rank to-day among the wittiest, most brilliant and happiest essays in all literature. Among his other famous contributions to the magazine were three novels, *Lights and Shadows of Scottish Life, The Trials of Margaret*

*Lyndsay* and *The Foresters*. In 1820 he was appointed professor of moral philosophy in the University of Edinburgh, not because he was at all learned in that subject, but principally because he was an ardent Tory. It has been truthfully said that some of his pupils knew more about the subject than he, but he was a wonderful talker and inspired many a young man in his classes. He died at Edinburgh in 1854.

**WILSON,** JOHN (1804-1875), a British missionary who was influential in spreading the Christian faith in India. He was born at Lauder, in Berwick, Scotland, and was educated at the University of Edinburgh. In 1828 he went to Bombay as a missionary for the Scottish Missionary Society, but later was in the service of the Free Church of Scotland. His long career in India, during which he mastered the languages of the people with whom he worked, was epoch-making in missionary history. Wilson served as vice chancellor of the Bombay University, and was twice president of the Bombay Branch of the Royal Asiatic Society. He was the author of several works on missionary subjects, and of *The Parsi Religion, The Lands of the Bible, India Three Thousand Years Ago* and other books on the Orient.

**WILSON,** WILLIAM LYNE (1843-1900), an American legislator and educator, born in Jefferson County, Virginia. At the age of seventeen he was graduated from Columbian College at Washington, D. C., and he then attended the University of Virginia for a year. Later he served in the Confederate army. From 1865 to 1871 Wilson was a professor of Latin at Columbian College; he practiced law from the latter date until 1882, and the next year became president of the University of West Virginia. From 1883 to 1895, while Democratic Representative in Congress from West Virginia, he served efficiently for two years as chairman of the Ways and Means Committee, introducing the Wilson Tariff Bill (see TARIFF), which became a law, and figuring prominently in the repeal of the Sherman Silver Purchase Law. In 1892 he was chairman of the Democratic National Convention, and three years later, under President Cleveland, served as Postmaster-General. On the expiration of his term he became president of Washington and Lee University, founded in 1749 at Lexington, Virginia.




**WILSON,** [THOMAS] WOODROW (1856- ), an American educator, historian and statesman, who has been president of Princeton University, governor of New Jersey, and was elected the twenty-eighth President of the United States. No President since the days of Lincoln has been confronted by more stupendous problems than Woodrow Wilson has faced. His influence has gone far in the readjustment of financial and economic matters, but most important, he has had to bear the very heavy burden of war. Personally a man of peace, and at first criticized because he tried to keep the United States out of war, he had to lead the nation in the most terrible conflict in the history of mankind. It is one of the interesting facts of his life that for more than a quarter of a century the science of government was his hobby; he studied about it, talked, wrote and taught about it. Then, while still in the prime of life, he was called on to put his theories into practice, first as governor and then as President. Wilson is the world's most conspicuous "schoolmaster in politics"; he has set at rest the unfavorable comment as to college professors in public life.

It is a generation—perhaps many generations—too early for an estimate of Woodrow Wilson as a statesman; yet certain facts are already clear. That he is one of the greatest of American Presidents is evident. When great readjustments take place in the affairs of a nation, the nation is almost always dependent for stability upon some statesman in whom intellectual keenness and great strength of character are combined. Such men in Europe were Pitt, Cavour and Bismarck—and such a man in America is Woodrow Wilson. He has shaped the course of a great nation along the lines which it had never pursued, and it may not be too much to say that when the last history of his administration is to be written, it will be seen that Woodrow Wilson inaugurated a new era.

**Youth and Education.** Woodrow Wilson is of Scotch-Irish ancestry. His grandfather, James Wilson, was an Ulsterman who left County Down in 1807 and settled in Philadelphia, where he obtained work as a printer. He prospered and eventually owned and edited two newspapers, the *Western Herald* published at Steubenville, Ohio, and the *Pennsylvania Advocate,* published at Pittsburgh. The youngest of James Wilson's seven sons was Joseph Ruggles Wilson (1822-1903). Joseph became a teacher and a Presbyterian minister, and was a distinguished member of the Presbyterian Church, South. He was for more than thirty years (1865-1899) stated clerk of the Church's General Assembly, and in 1879 served as moderator. His life was an active one, as can be seen from a list of his pastorates and professorships: from 1851 to 1855 professor of chemistry and natural science at Hampden-Sydney College; 1855-1858, pastor at Staunton, Virginia; 1858-1870, pastor at Augusta, Georgia; 1870-1874, professor of theology in Columbia (S. C.) Theological Seminary; pastor at Wilmington, N. C., 1874-1885; professor of Theology, Southwestern Presbyterian University, 1885-1893.

It was at Staunton, where Joseph Wilson was then pastor, that his third child and first son was born, on December 28, 1856. The child was named Thomas Woodrow, in honor of his maternal grandfather, a Scotch Presbyterian minister who had been a missionary in Canada and later a pastor at Chillicothe, Ohio. Janet Woodrow, his daughter, married Joseph Ruggles Wilson in 1849. Young Thomas (in later life he dropped this name and elected to be called Woodrow) had no formal schooling until his ninth year, at the end of the War of Secession. In spite of his late start he was ready for college at seventeen, and in 1873 entered Davidson College. There he stayed less than a year, for his health failed as the result of overrapid physical development. After an interval of a little more than a year, he entered at Princeton (September, 1875).

In college Woodrow Wilson was distinguished for his insatiable desire for reading. He seems to have been popular; in his senior year he was one of the directors and secretary of the board of the football association, and also stood above the average in scholarship (thirty-eighth at graduation in a class of 106). But he won real distinction for his literary activities. He was for two years a member of the editorial board of *The Princetonian,* and during his senior year was its managing editor. He also contributed to another undergraduate publication, the *Nassau Literary Magazine,* a prize essay on William Pitt, Earl of Chatham.

After receiving his bachelor's degree from Princeton in 1879, young Wilson entered the law school of the University of Virginia. There again over-concentration on his studies affected his health, and he had to withdraw after a year. In 1882, however, he went to Atlanta, Georgia, to begin the practice of law. But clients were few, and he was still deeply interested in jurisprudence and political science, and he finally decided to desert the law and make himself a specialist in the latter field. In 1883 he therefore began post-graduate study at Johns Hopkins University, where his career was brilliant.

**Wilson, the Educator.** His two years at Johns Hopkins University ended the student days of the future President. He was now nearly thirty, but he soon proved that the delays which had held him back had also given him time to build a broad, solid foundation. In 1885, immediately after taking his degree at Johns Hopkins University, he was appointed associate professor of history and political science at Bryn Mawr College. From 1888 to 1890 he was professor of the same subjects at Wesleyan University, and then was called to the chair of jurisprudence at Princeton University. In 1902 he succeeded Dr. Patten as president of that institution, being the first layman ever chosen to that office. He remained as president until 1910.

This is the bare outline of his activities for a quarter of a century. During this period he gradually won a place, first as a publicist, and

second as an educational administrator. He delivered frequent addresses, and contributed freely to periodicals on educational topics; at the same time he made a name for himself as a teacher. His courses were largely attended, because the man himself, as well as his methods of presenting knowledge, was attractive.

Wilson's presidency at Princeton was notable for the many reforms he introduced. The undergraduate course of study was revised, the physical plant was greatly improved, the teaching staff was strengthened by the addition of

WOODROW WILSON
WAR PRESIDENT

A man of high intellect, whose mind has been refined by study and whose penetrating vision perceives all shades of American opinion. He possesses in the highest degree two masterly qualities which mark the statesman, namely, patience, wherein no event can draw from him a premature conclusion, and when he has reached his conclusion, action, from which nothing can make him recede.

distinguished specialists, and an endowment fund was raised for the Graduate School. Altogether the most important change was the introduction of the preceptorial system. The underlying principle of this system is a more intimate and effectual contact between teacher and pupil than the formal lecture courses provide. His purpose, as stated in his own words, was to transform Princeton "from a place where there are youngsters doing tasks to a place where there are men thinking." His administration of the university placed him practically on a level with other great college presidents, like Eliot of Harvard, Angell of Michigan, Jordan of Leland Stanford and Butler of Columbia, and made him a national figure.

**The Man of Letters.** It was his literary work which first drew wide public attention to Woodrow Wilson. His work as a man of letters, with only a few exceptions, falls wholly within the period of his activity as an educator. The remarkable feature of this entire output is the evidence it gives of a sustained interest and concentration of purpose. While President of the United States, Wilson once said that he had "a single-track mind." His literary work, all in the field of political science, seems to show that he meant what he said and knew it to be true. His first book, *Congressional Government: A Study in American Politics,* was submitted as a thesis for his doctor's degree, but unlike most theses it immediately became a political classic. It is one of that small class of books which includes Bryce's *American Commonwealth* and Bagehot's *The English Constitution,* which no library on political science should lack.

Scarcely less important is his manual on *The State: Elements of Historical and Practical Politics.* This comprehensive volume traces government to its origins. Among Wilson's other books are *Division and Reunion,* dealing with American history from 1829 to 1889; *Mere Literature and Other Essays; George Washington; Constitutional Government in the United States; The New Freedom,* written in 1913; *When A Man Comes to Himself,* and *A History of the American People,* a five-volume work which has become deservedly popular and is recognized as authoritative. The volume and variety of Wilson's literary activities were not as great as those of some other Presidents, but they were sufficient to secure his election to the American Academy of Arts and Letters and to other literary organizations. He was the seventh President of the United States who, when elected, was a member of the American Philosophical Society.

**Governor of New Jersey.** New Jersey, politically, has generally been an example of what a state ought not to be. About 1910 there arose a demand for a new type of government, a demand which found its object in Woodrow Wilson. By training, attainments and character, Woodrow Wilson was particularly well qualified to serve as a popular leader. He took no part in the movements to enlist popular support for his candidacy, but when the Democratic state convention named him on the first ballot he acted without hesitation.

In accepting the nomination, Wilson addressed the convention in words which, with

only slight changes, might form a record for his administration. The program and the performance of a candidate for public office have rarely corresponded so closely. In part, he spoke as follows:

> I take the three great questions before us to be reorganization and economy in administration, the equalization of taxation and the control of corporations. There are other very important questions that confront us, as they confront all the other states of the Union in this day of readjustment: the question of the proper liability of employers, for example; the question of corrupt practices in elections; the question of conservation; but the three I have named dominate all the rest. It is imperative that we should not only master them, but also act upon them, and act very definitely.

In these words he outlined his program; by changing the tenses, he might, two years later, have summarized his governorship. He was elected by a plurality of more than 49,056, although in the preceding election the Republican candidate had a plurality of 82,776. The Republicans retained control of the state senate, but during most of his term coöperated willingly with the Democrats on matters of general public policy. The legislature passed the governor's program practically as he wanted it, though not without a struggle. As governor Wilson used a weapon which few other governors have used—the direct appeal to the people. The most notable example of this appeal concerned the election of a United States Senator in 1911. The advisory primary vote of the people favored James E. Martine, but the Democratic machine politicians planned to force through the legislature the election of one of the party leaders. Governor Wilson advised the new candidate to withdraw, and when the latter refused, made an open appeal to the people. This appeal he followed by a tour on the stump on behalf of Martine, who was triumphant when the legislature met.

In other matters Governor Wilson established new precedents. He gave the office seekers a shock when he went outside the state for a superintendent of schools. He was in frequent consultation with members of the legislature, and he never hesitated to use his influence in favor of reforms. He shocked many more or less reputable corporations by securing a revision of the state's trust laws, so that New Jersey, instead of setting a bad example, has become a model for other states in this regard.

It was inevitable that a personality so striking as Woodrow Wilson's, which expressed itself in so many novel forms, should command national attention. Almost before he began his service as governor there were hints that he would be an acceptable nominee for the Presidency, and when the Democratic national convention met at Baltimore in 1912 he was the candidate favored by the progressive, "forward-looking" Democrats. For the actual nomination Wilson owed a great debt to William Jennings Bryan, who fought against heavy odds, but fought a good fight to a successful finish (see BRYAN, WILLIAM JENNINGS). But the popular demand which Bryan represented was spontaneous, and was the work of no one man or group of men.

Because of the split in the Republican party (see ROOSEVELT, THEODORE; TAFT, WILLIAM HOWARD) the election of Wilson was almost a foregone conclusion. The Democratic campaign was ably managed, but Wilson himself took little active part. He refrained especially from the distressing personalities which marked the quarrel among the Republicans. He received 435 electoral votes to 88 for Roosevelt and 8 for Taft. His electoral majority was the largest ever received by a Presidential candidate. The popular vote was much closer. The vote was 6,286,214 for Wilson; 4,126,020 for Roosevelt; 3,483,922 for Taft. Wilson, therefore, like Lincoln, was a minority President.

## *The Administrations of Woodrow Wilson*

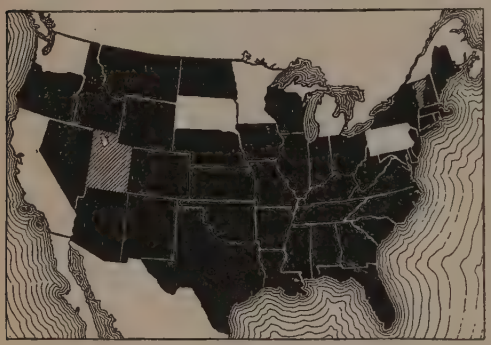
**Constructive Legislation.** Promptly after his inauguration the President summoned Congress in special session for the purpose of revising the tariff. The President in person appeared before Congress and delivered his message, thus returning to the practice of Washington and John Adams. The Democratic leaders, Representative Underwood of Alabama and Senator Simmons of North Carolina, drafted a bill which was passed, after a sharp struggle, on October 3, 1913. The duties as a whole were reduced to a level of about 20%. Certain features of the bill, particularly the schedules on wool and cotton goods and sugar, met strong opposition, but were forced through both houses with the aid of strong pressure from the President. Also noteworthy was the addition of an income tax, designed to replace the revenue lost by removing the duty on sugar. The income tax was made possible by the adoption of the Sixteenth

Amendment to the Constitution in the closing hours of the Taft administration.

At the time of its passage the Underwood-Simmons Tariff Act was popularly regarded as more important than the Glass-Owen, or Federal Reserve, Act, which was the second great legislative achievement of the Wilson administration. To secure the passage of this act the President's influence was again brought to bear on Congress. In spite of some important amendments, the act as passed was substantially in the form in which it was first presented to Congress. Before Congress finally adjourned it passed two more constructive measures, the Clayton Anti-Trust Act and the Trade Commission Act. The former prohibited interlocking directorates and otherwise defined the government's attitude towards the trusts; the latter provided a commission of five members, whose relations to corporations generally were planned to correspond to those of the Interstate Commerce Commission to railroads (see TRUSTS).

With the passage of these four important laws, the Wilson administration concluded its program of constructive legislation, a record probably unparalleled in the history of any preceding Congress. Congress was in session for a longer continuous period than at any other time in the nation's history, and the laws it passed went unhesitatingly to the bottom of business and financial conditions. The success of the President in driving these bills through Congress proved him a capable party leader as well as a far-seeing statesman. So, too, in the matter of repealing the Panama Canal tolls exemption clause (see page 4474), he appealed to Congress to act both as a matter of statesmanship and as a matter of policy. The law, he said, was an economic mistake, a political wrong and a tactical error. In spite of opposition, particularly from those who declared that he was lowering the American flag to the demands of foreigners, he succeeded in convincing Congress that the exemption should not be allowed to stand.

**The Mexican Problem.** Perhaps the thorniest problem the administration had to face in 1913 and 1914, and the one whose attempted solution caused unbounded criticism, was the Mexican problem. The President adopted a policy which was popularly known as "watchful waiting," which meant that military pressure would not be used against Mexico's warring factions except as a last resort. Every other kind of pressure, however, including moral, economic and financial, was brought to bear on Huerta, whom the administration refused to recognize as the lawful President of Mexico. In December, 1913, President Wilson read a special message to Congress, in which he stated there could be no peace in Mexico until Huerta was eliminated. Meanwhile the counter-revolution, led by Carranza and Villa, was making some progress; and after February, 1914, when President Wilson removed the embargo on the shipment of arms, it made rapid progress.



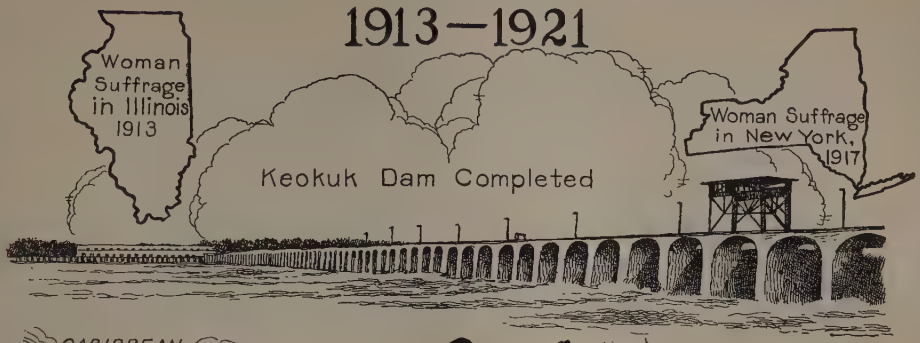
ELECTION MAP OF 1912

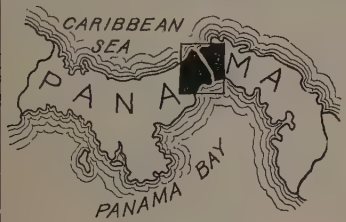
ELECTION MAP OF 1916

States in black in both maps gave their electoral votes to Woodrow Wilson, Democrat; in white (1912) to Theodore Roosevelt, Progressive; in shaded lines (1912) to William H. Taft, Republican; in shaded lines (1916) to Charles Evans Hughes, Republican.

On April 9, 1914, occurred the Tampico incident, when a number of American marines were arrested by a Mexican officer. Rear-Admiral Mayo, the American commander, demanded their immediate release, which was granted, and an apology and a salute to the United States flag, both of which were refused. After negotiations failed, President Wilson, on April 20, asked and received from Congress power to use the military and naval forces to secure reparation. Then followed the occupation of

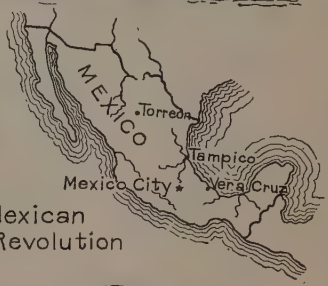
# WILSON'S ADMINISTRATIONS
## 1913—1921




Panama Canal Completed

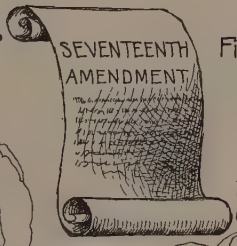
The Nation Goes To War

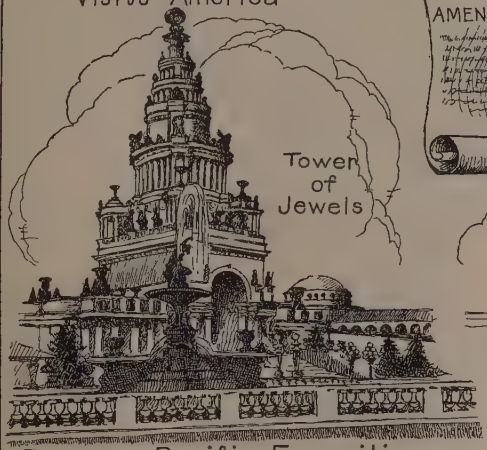



Mexican Revolution

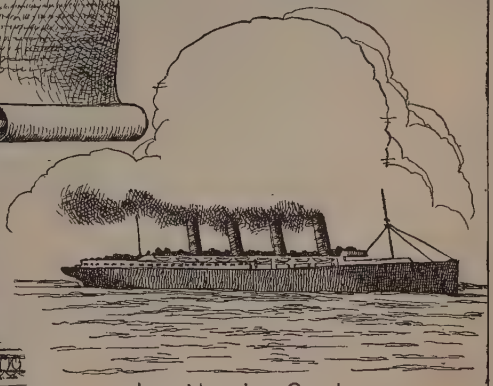
Joffre, Hero of the Marne, Visits America

General Pershing, First American Commander in France




Panama-Pacific Exposition



Lusitania Sunk, May 7, 1915

Vera Cruz, at a cost of eighteen dead. But before intervention progressed beyond Vera Cruz, the United States accepted the offer of mediation made by Argentina, Brazil and Chile (the "A B C powers"), and the commissioners met at Niagara Falls to discuss means of obtaining peace. While the commissioners were in session Huerta resigned, and turned the government over to Francisco Carbajal, who stepped aside for Carranza a month later.

General Francisco Villa, Carranza's chief of staff, then quarreled with the latter, and led another revolution against the government. Carranza, after an uncertain period when it seemed that he might be defeated, gradually increased in power and restored a measure of order to parts of Mexico. On October 19, 1915, President Wilson formally recognized Carranza as the head of the Mexican government. Meanwhile Villa, gradually driven northward by Carranza's troops, took refuge in Chihuahua, and from there made numerous raids on American settlements. To hold him in check the President called out the militia to patrol the border, and sent General Pershing, with a force of regular soldiers, to take Villa, "dead or alive." An overconscientious regard for the sensibilities of Carranza, who insisted on restricting the operations of General Pershing's force, nearly cost the lives of that entire force and finally compelled its return without its quarry.

**Other Foreign Relations.** The repeal of the Panama Canal tolls exemption, at the request of Great Britain, has already been referred to. Another disturbing factor was the Japanese Land Bill, passed by the state of California in 1913. In an effort to modify the state's course, Secretary of State William J. Bryan went to California, but the legislature resolutely followed its own plans. On May 2, 1913, the United States recognized the new republic of China, and about the same time the United States ratified a treaty which practically gave it a protectorate over Nicaragua. In 1915 the financial affairs of Haiti were placed under the direction of American advisers, a plan similar to that worked out for Santo Domingo.

**The War of the Nations.** Altogether the greatest problems faced by President Wilson all centered about the war which was raging in Europe. As the struggle progressed it became more and more difficult to maintain American neutrality. Both sides adopted indirect methods of inflicting injuries on each other, with the result that neutrals, especially the United States, were the chief sufferers. The British established a blockade against Germany and the Germans began to torpedo neutral ships within the limits of a so-called "war zone." Several American ships were sunk by German submarines early in 1915, and in May the world was shocked by the sinking of the *Lusitania*, when more than a thousand people lost their lives; among them were 112 Americans. Many Americans felt that this act justified a declaration for war against Germany, but the President refused to be stampeded, and for two years carried on negotiations, by which he hoped to induce the Germans to abandon the illegal use of the submarine as an offensive weapon. Several times it seemed as if he had finally won his point and had persuaded the Germans not to torpedo merchant ships without warning; but each time he was disappointed, until finally there remained only one course open to the United States—to declare war. (For details of the events leading to the declaration against Germany, see WAR OF THE NATIONS.)

**How the Crisis Was Met.** The entrance of the United States into the war was followed by marked economic and industrial changes. New legislation in various fields was necessary. For example, foreign-built ships were admitted to American registry, and special emergency insurance for ships was provided by the government. The government assumed control, to a greater or less degree, of certain industries, particularly those engaged in the manufacture of munitions. Exports were curtailed, and embargoes were placed on shipment of various articles needed at home. Taxes were sharply increased, particularly the taxes on large incomes of individuals and corporations. Food and fuel were to a considerable degree placed under the control of the Federal government. The head of the Food Administration was Herbert Hoover; of the Fuel Administration, Harry A. Garfield, a son of President Garfield. The heads of these departments appointed administrators for each of the states, and the latter delegated a part of their authority to county and municipal administrators.

One of the striking features was the successful flotation of the great "Liberty Loans," the greatest single bond issues ever attempted. By far the most significant result of American participation was the voluntary adoption of registration and conscription for all men between the ages of twenty-one and thirty-one, and the drafting of the wonderful National Army. To a greater degree than had ever happened be-

# *OUTLINE AND QUESTIONS ON WOODROW WILSON*

## *Outline*

**I. Preparatory Years**

(1) Birth and ancestry
  (a) Father a Presbyterian clergyman
(2) Education
  (a) A graduate of Princeton
  (b) Law study
  (c) Post-graduate work at Johns Hopkins
  (d) Doctor's thesis a classic

**II. Career as an Educator**

(1) Professor at Bryn Mawr, Wesleyan and Princeton
(2) President of Princeton University
  (a) Introduction of preceptorial system
  (b) Ranks with America's greatest university executives

**III. Governor of New Jersey**

(1) Progressive and idealistic program
(2) Triumph over machine politicians
(3) Securing of reforms
  (a) Revision of state trust laws
(4) Acceptance of Presidential nomination

**IV. Administrations**

(1) Constructive legislation
  (a) Underwood-Simmons Tariff Law
    1. Income tax provisions
  (b) Glass-Owen Federal Reserve Act
  (c) Clayton Anti-Trust Act
  (d) Trade Commission Act
  (e) Repeal of Panama tolls exemption clause
(2) Mexican problem
  (a) "Watchful waiting" policy
    1. Refusal to recognize Huerta government
  (b) Tampico episode
    1. Occupation of Vera Cruz
    2. Mediation of "A B C" powers
  (c) Border raids by Villa
    1. Pershing's expedition into Mexico
    2. Recall of United States troops
(3) Other foreign relations
  (a) The Japan question
  (b) Recognition of the Chinese republic
  (c) Treaty with Nicaragua
  (d) Haiti and Santo Domingo
(4) War of the Nations
  (a) Efforts to keep the United States neutral
  (b) Sinking of the *Lusitania*
  (c) Two years of diplomatic correspondence
  (d) Reëlection of the President
(5) The nation at war with Germany
  (a) Increase of merchant marine
  (b) Food and Fuel Administration Boards
  (c) Embargoes on foodstuffs, etc.
  (d) Increased taxes and Liberty Bond flotations
  (e) Registration and conscription of men between 21 and 31
  (f) Measures to curb disloyalty and treason
(6) Miscellaneous events
  (a) Completion of the Panama Canal
  (b) Panama-Pacific and Panama-California expositions
  (c) Adoption of Seventeenth Amendment
  (d) Rapid advance of woman suffrage and prohibition movements

## *Questions*

Why is Wilson spoken of as a conspicuous example of the "schoolmaster in politics?"

What similarity is there between his acts as a Peace President and as a War President?

What basis is there for the statement that Wilson ranks with the greatest of American Presidents?

In what special field of writing is this President an acknowledged authority?

How does he rank as a university president?

Compare Wilson and Roosevelt as to their methods while Presidents.

fore, the participation of the United States in the war made every American a cog in the great war machine. Individual interests had to be sacrificed. Never before had the United States made such tremendous demands on itself. (For further details of America's participation and the events which led up to it, see WAR OF THE NATIONS.)

During the years 1913-1916 President Wilson devoted his energies partly to domestic problems and partly to the task of keeping the nation out of war. His success in the latter task was one of the appeals for his reëlection in 1916. To be sure, he stood on his record as a whole, including the legislative achievements of the administration. The Republicans, after a period of uncertainty, nominated Charles Evans Hughes, an Associate Justice of the United States Supreme Court. Wilson was reëlected by an electoral vote of 277, as against 254 for Hughes.

President Wilson's second term was first devoted to the organization of the nation for war. Until 1915 he had been opposed to any extensive preparations for war, but events of that year changed his mind, and in December, 1915, his message to Congress dealt almost exclusively with the subject of preparedness. The enlistment of the United States among the allies took place almost at the beginning of Wilson's second term, and the distinction in underlying purpose was marked before and after the winter of 1916-1917.

**Other Events.** Many other important events must be recorded of Wilson's administration. First, perhaps, should come the completion of the Panama Canal (which see). This was commemorated by two great expositions, the Panama-Pacific at San Francisco and the Panama-California at San Diego, California, both held in 1915. The terrible floods in the Ohio Valley in 1913, the Hetch-Hetchy Reservoir Law of 1913 and the agitation which preceded it; the completion of the Keokuk Dam in 1913 and of the Cape Cod Canal in 1914; adoption of the Seventeenth Amendment, providing for the direct election of United States Senators, and the granting of partial suffrage to women in Illinois (1913) and full suffrage to those in New York (1917) were all events of significance. The acceptance of women as voters in Illinois was especially noteworthy because it was the first state east of the Mississippi to take this action; New York's vote, and that of Rhode Island, which had previously granted women Presidential suffrage, broke the solid East, which had been unanimously against equal suffrage.

An epoch was marked by the appointment of Louis D. Brandeis to the United States Supreme Court. Mr. Brandeis was not merely the first Jew to sit on this court, but he was the first Justice who was a so-called "radical." A fight of five months preceded his confirmation by the Senate, as many Senators preferred a more conservative man.

**Private Life of the President.** Although President Wilson and his family did not arouse the personal interest in their private affairs which was so striking a characteristic of some of his predecessors, the nation as a whole extended its deepest sympathy to the family when Mrs. Wilson died. As Ellen Axson, of Savannah, Georgia, she had married the young lawyer on June 24, 1885. On August 6, 1914, during the first week of the War of the Nations, she died. A man of strong domestic inclinations, the President naturally craved a helpmate, and his friends were gratified by the announcement that he was to be married a second time. On December 18, 1915, he became the husband of Mrs. Norman Galt, formerly Miss Edith Bolling, of Wytheville, Virginia. During his Presidency two of his daughters were married in the White House—Jessie to Francis B. Sayre, and Eleanor to William G. McAdoo, Secretary of the Treasury. The third and eldest daughter, Margaret, is a singer of ability and is noted for her activities in social welfare. W.F.Z.

Consult: J. G. Wilson's *Presidents of the United States,* vol. 4; Ford's *Woodrow Wilson;* Hosford's *Woodrow Wilson.*

**WINCHELL,** *win'chel,* ALEXANDER (1824-1891), an American geologist and university professor, born in North East, Dutchess County, N. Y. He was graduated at Wesleyan University, Middletown, Conn., in 1847, and in 1863 became professor of botany and geology in the University of Michigan. From 1873 to 1874 he was chancellor of Syracuse University, but resigned to become professor of geology, zoölogy and botany in that institution; in 1875 he was appointed to a similar position in Vanderbilt University, Nashville, Tenn. Until 1878 he filled both positions. In 1879 he was recalled to the University of Michigan, and held there until his death the professorship of geology and paleontology. His published writings embrace *The Doctrine of Evolution, The Geology of the Stars, Sparks from a Geologist's Hammer* and *Sketches of Creation.*

**WIN'CHESTER,** Mass., an attractive residential town in Middlesex County, eight miles northwest of Boston. It is served by the Boston & Maine Railroad and by interurban lines. Beautiful homes, a public library, a home for aged people, the state aviary and Middlesex Fells, a state park of more than 3,000 acres partly within the town, are its most interesting features. Practically the only industrial plants are manufactories of felt goods, leather, machinery and watch hands. Winchester was settled in 1638 and was then called Waterfield. Charlestown Village was the name adopted in 1640, which gave place to Woburn in 1642, and that was replaced by the present name in 1850. Population in 1910, 9,309; in 1916, 10,603 (Federal estimate).

**WIND.** The general circulation of the atmosphere may be illustrated by the following experiment: Take a box nine or ten inches square, cut holes in the sides near the bottom, and a hole about four inches in diameter in the center of the lid. Place a lighted lamp in the box, close the lid and test the openings for air currents. It will be found that air is entering the box through each of the openings at the bottom and that it is escaping through the opening in the lid. The explanation for this is as follows:

The lamp heats the air in the box, and as it becomes heated it expands and rises, escaping through the opening in the lid. This movement lessens the pressure of the air in the box, and the greater pressure on the outside forces air through the openings to take the place of that escaping. Were the lamp burning in the open air it would cause the same currents, but they could not be so easily detected.

**Causes of Wind.** What may be illustrated on a small scale by the box and lamp is taking place continuously on the earth on a large scale.

THE WINDS ON THE OCEANS

Unobstructed by land masses, the winds on the sea take the general direction of the arrows in the illustration. They are identified as follows: (1) Occasional northeasterly winds; (2) westerly winds; (3) northeast trade winds; (4) monsoons; (5) southeast trade winds; (6) strong westerly winds.

We live at the bottom of a vast atmospheric ocean whose ebb and flow are as ceaseless as those of the sea, and to these movements of the atmosphere the term *wind* is generally applied. The experiment shows that difference in temperature is accompanied by difference in pressure. It is the unequal temperature of the atmosphere over different parts of the earth that is the chief cause of wind. A wind is named according to the direction from which it blows. An east wind, for instance, blows from the east.

The cause of wind is readily understood by a study of the general circulation of the atmosphere, theoretically shown in the accompanying diagram. The region along the equator is the most intensely heated of any part of the

earth's surface. The atmosphere over this belt is consequently warmer and lighter than that on either side, and is forced upward by the higher pressure of the heavier air. Over the equatorial regions then, there is constantly an ascending current, and since this current is not perceptible, sailors call this region the *belt of equatorial calms.* As the air rises there is a constant surface current from the tropical latitudes towards the equator. Were it not for the rotation of the earth these currents would be due north and south currents; but in flowing from the polar towards the equatorial regions the atmosphere is constantly coming in contact with portions of the earth whose velocity of rotation is greater than that of the region from which they come. Since the air is unable to acquire this velocity as rapidly as the solid earth, these currents lag behind, as it were. In the northern hemisphere they blow from the northeast and in the southern from the southeast.

The ascending current over the equator soon reaches an altitude where the surrounding atmosphere is of equal density, and it becomes a horizontal current, flowing towards the poles. The farther this current flows the cooler it becomes, until, in the temperate latitudes, it reaches the same temperature and density as the surface layers of atmosphere, and gradually mingles with them. Since this mingling of currents of equal density equalizes the atmospheric pressure over these regions, there may be large areas on the ocean where for days together there is no wind. These regions are known as the *calms of Cancer* and the *calms of Capricorn.* Outside these belts of calms the currents flowing from the equator become surface currents, forming westerly winds. Here again the deflection from a north and south course is caused by the rotation of the earth. Currents flowing towards the polar regions are flowing from regions of higher to those of lower velocity of rotation, and they run ahead or blow towards the east.

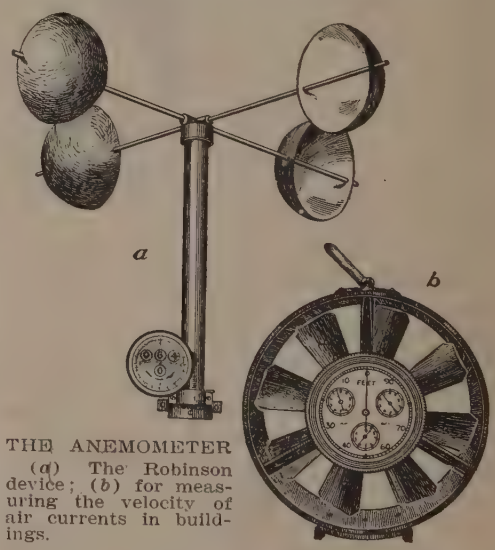
In the upper regions of the atmosphere winds often blow contrary to those on the surface, a fact easily verified by observing the clouds. Lofty mountains, the shape of the continents, and minor local causes affect the surface currents, so that a detailed study of winds is decidedly complex.

**Classification of Winds.** A steady wind is one that blows constantly in the same direction, as the trade winds. A periodic wind is one that blows at stated intervals, such as land and sea breezes and monsoons. Variable winds are irregular, and are due to local causes, such as the sudden rise in temperature over a small area on a hot summer day.

**Effects of Wind.** A cold wind blowing into warm regions has its capacity for moisture increased. Therefore, such winds usually assure clear skies and bright days. On the contrary, a warm wind blowing into a cooler region has its capacity for moisture decreased. A portion of its water vapor is condensed, forming clouds, and if the condensation is carried to the point of saturation, rain falls. The rainfall of a locality is, therefore, largely determined by the prevailing winds. A gentle breeze equalizes temperature, and keeps the air in circulation, thereby preventing such an accumulation of impurities in any locality as would vitiate the atmosphere. After a heavy fall of rain the wind hastens the evaporation of water and drying of the land.

Wind is a destructive agent when its velocity becomes so great as to endanger life and damage property, as in a severe gale or a tornado. Wind is an active agent in the formation of soil, and in wearing away of rocks in desert regions and in the formation of sand dunes.

**The Anemometer.** Wind blows from areas of high towards areas of low pressure, and the velocity depends upon the difference in pressure.




THE ANEMOMETER
(*a*) The Robinson device; (*b*) for measuring the velocity of air currents in buildings.

When the difference is great there results a high wind, and when it is nearly equal, a gentle breeze. The velocity of wind is measured by the anemometer, which consists of four hemispherical cups attached to the ends of horizon-

tal bars that are mounted on a vertical axis. The lower end of the axis is attached to a system of clockwork which registers the number of revolutions per minute, and from this the velocity of the current is determined. Anemometers are in use in all Weather Bureau stations. The pressure of the wind depends upon the velocity of the current and the density of the atmosphere. Since the density is constantly varying, no exact rule for the computation of pressure is available. C.H.H.

Consult Abbe's *Mechanics of the Earth's Atmosphere.*

**Related Subjects.** The following articles should be read in connection with this subject:

| | |
|---|---|
| Barometer | Land and Sea Breezes |
| Calms, Regions of | Meteorology |
| Chinook | Monsoon |
| Climate | Norther |
| Cloud | Prevailing Westerlies |
| Cyclone | Rain |
| Desert | Simoom |
| Doldrums | Sirocco |
| Dune | Storms |
| Erosion, subhead *Atmosphere* | Tornado |
| Hurricane | Trade Winds |
| Isobars | Typhoon |
| Khamsin | Weather Bureau |
| | Whirlwind |

**WINDERMERE,** *win'der meer,* England's largest lake, a beautiful stretch of water in the northwestern part of the country, in the counties of Lancashire and Westmoreland. Windermere lies in a district whose beauty of scenery inspired the poets Wordsworth, Southey and Coleridge. The lake has an area of about five square miles. Its depth varies from thirty to more than 200 feet, and the greatest width is one mile. The Leven River flows from Windermere into Morecambe Bay. The shore line of the lake is steep and rugged, and it contains several picturesque islands.

**WINDHOVER,** *wind'huv er.* See KESTREL.

**WIND'LASS,** a machine for lifting weights by the application of a relatively small power. The ordinary windlass, such as one sees in wells, is a wooden drum on which a rope or chain is wound by handspikes or a winch attached to the end. A bucket, fastened to the end of the chain, is brought up by turning the rope over the cylinder. The windlass is really a variety of the wheel and axle, which, again, is a modification of the lever. The ease with which a heavy stone, which cannot be lifted by hand, may be pried up with a lever has been observed by almost every one. For an explanation of how this principle applies to the windlass, see WHEEL AND AXLE, where illustrations will be found. The lifting power of a windlass may be considerably increased by connecting the drum and the winch by means of cog wheels, the larger wheel being on the drum.

**WINDMILL,** a device which utilizes the force of wind for carrying on various operations requiring only moderate power. Windmills are commonly used on farms to pump water and to run feed cutters and churns. The mill in general favor consists of a wheel formed of a number of inclined slats of wood or metal, which rotates on a horizontal axis. The slats are so arranged that the wind strikes them on the slant as it blows between them, thus forcing them along and making the wheel revolve. A vane is attached to the opposite side of the frame, as a result of which the wheel always faces the wind. By means of suitable gearing the speed of the device can be regulated. The structure is mounted on a conical or pyramidal tower twenty or more feet in height, to get the full force of the wind. Some mills develop as high as four horse power, though a much lower power than this is ample for most farm operations. The type of windmill described is pictured on page 6222.

The mill described has largely superseded the old-fashioned Dutch windmill, which is equipped with a power wheel having four radial arms covered with canvas (see page 4125). The tower usually rests on wheels, and is turned around when it is necessary to set the sails toward the wind. For many years Mishawaka, Ind., was the chief center of windmill manufacture in the United States, but the industry is now more widely distributed.

**WINDOW,** *win'doh,* an opening in solid walls of a building for admission of light and air. Modern windows are for the most part openings in vertical walls, with a framework containing glass so arranged that it may be opened and shut at will. The windows of the ancient dwellings of Greece and Rome were merely openings in the wall, screened with curtains. Many houses in tropical countries are still built in this same way. The use of glass in windows in England was heavily taxed in the seventeenth century, and as windows had then assumed great architectural importance this led to the custom of painting imitation windows on the outside walls of houses to produce an imposing appearance. The first year the window tax was levied the returns amounted to over $5,000,000, and the tax was not repealed until 1851, at which time the revenue was nearly $10,000,000 annually.

In ancient buildings windows were more decorative than useful, but in modern countries ornament has given place to utility, and they are constructed for the purpose of admitting the greatest possible amount of light and air. While in private dwellings the use of ornamental architecture and stained glass is increasing, the windows are being made larger, so there remains a plentiful allowance of clear glass space for the admission of light. So great is the demand for windows in modern buildings in America that a European traveler described a towering office building as "a series of windows held together by bricks." See Rose Window.

**WIND'PIPE.** See Trachea.

**WINDSOR,** *win'zer,* the county town of Hants County, Nova Scotia, in the central part of the province. It is situated at the confluence of the Saint Croix and Avon rivers, a short distance above the mouth of the latter in the Basin of Minas. It is on the Dominion Atlantic Railway, forty-five miles northwest of Halifax and fifteen miles southeast of Grand Pré, the heart of the land of Evangeline. Population in 1911, 3,452.

For practical purposes Windsor is a seaport, for the Avon River is navigable. The town stands third among Nova Scotia ports as an exporter of lumber, and also has a large trade in hard and soft gypsum, vast deposits of which exist in the neighborhood. Among the manufacturing establishments are plaster mills, saw mills, furniture and chair factories, a foundry, an apple evaporating factory and a glue and fertilizer factory. Windsor is also well-known as the seat of King's College, which was established in 1790. With the exception of Laval (which see), this is the oldest college in what is now the Dominion of Canada. It has always been closely connected with the Church of England, and until 1902 its president was required to be a clergyman. Under its charter the Archbishop of Canterbury is its patron. The school of law is at Saint John, N. B., and the engineering school is at Sydney.

**WINDSOR,** a city in Essex County, Ontario, on the Detroit River, opposite the city of Detroit. It is one of the largest manufacturing communities in Canada, and its customs receipts are fifth in amount among Canadian cities. Its strategic position, as the southernmost Canadian city of importance, and its proximity to the United States at the narrowest part on the Detroit River, have combined to bring to it industries of all kinds. It is the principal center in Canada for the manufacture of automobiles and drugs, and also makes large quantities of steel products, including fans, blowers, wheels, brakes, adding machines, fencing, window sash, etc. In or near Windsor are the Canadian branches of many of the best known manufacturers in the United States, including the Ford, Maxwell and Hupp Motor Car companies, Horlick's Malted Milk Co., Burroughs Adding Machine Co., Postum Cereal Co., and Remington Arms Cartridge Co. The plant of the Canadian Salt Company is perhaps the largest of its kind in the Dominion.

Windsor is one of the natural gateways of the Dominion. In addition to passenger and freight steamship lines, it is served by the Canadian Pacific, the Grand Trunk, the Michigan Central, the Pere Marquette and the Wabash railroads, all of which are connected for industrial purposes by the Essex Terminal Railway, or Belt Line. Connecting Windsor with Detroit are ferries of various kinds, including several for railroad cars; some of these will accommodate a dozen cars or more. Windsor manufacturers use power both from natural gas and from the hydro-electric system. The city owns its waterworks and sewage system. Windsor was settled in 1812, and was named for Windsor Castle, in England. Population in 1911, 17,829; in 1915, estimated, 25,000.

**WINDSOR CASTLE,** *win'zer kas''l,* a magnificent royal palace at Windsor, twenty-one miles from London, and the chief residence of the sovereigns of Great Britain. Before the Conquest the Saxon kings had their residence

NORMAN GATEWAY, WINDSOR CASTLE
William the Conqueror selected the site and erected the first building.

at Old Windsor, two miles away, but William the Conqueror chose the site of the present structure and there built his castle. His successors added to this, but Edward III had the

old building torn down, and began a new one, of which the dominating feature was the round tower, or keep, which still forms the center of the pile of buildings. It is eighty feet in height, and is built on a rise of ground, so it commands a beautiful view and is visible far over the surrounding country. Under later kings the structure was added to, until to-day it covers about twelve acres. To the west of the central tower is what is known as the lower ward, which contains, in addition to other halls and buildings, Saint George's Chapel, begun by Edward IV and finished by Henry VIII, in the vault of which lie the bodies of Henry VIII, Charles I, George III, William IV and other sovereigns; and the beautiful Albert Chapel, begun by Henry VII and completed in splendid style by Queen Victoria, as a memorial to her husband. To the east, in the upper ward, are the royal apartments and the great state rooms.

The castle stands in the Little Park, which is connected by an avenue with the Great Park. Near this latter is the celebrated Windsor Forest. In the Little Park, about half a mile from the castle, is a magnificent mausoleum, in which lie the bodies of Queen Victoria and her husband, Prince Albert.

**WINDWARD ISLANDS,** a British colony in the West Indies consisting of Saint Lucia, Saint Vincent and Grenada, with the smaller islands of the Grenadine chain. The islands really form three distinct colonies, united under a governor-in-chief, who resides at Saint George's, Grenada. The Windward Islands derive their name from their position, being more exposed to the trade winds than are neighboring islands. See LEEWARD ISLANDS.

**WINE,** the fermented juice of fruits, especially of the grape. The juice of the grape contains grape sugar already formed, and like the juice of the apple, the gooseberry, and many other fruits, it undergoes fermentation quite readily. The quality of wine varies greatly with different soils, care and method of handling. The wines most highly prized are still produced exclusively in Europe, although the California wine industry is important.

The juice of the grape is removed in a crushing machine having two cylinders so far apart that they do not crush the seeds. The *must,* or pulp, is fermented in huge vats of oak, having a capacity of from twenty-five to one hundred barrels. When the fermentation has reached the stage desired for the particular sort of wine, the juice is run off into reservoirs called *tuns,* where it remains until matured.

Dry wines are produced by allowing the process of fermentation to proceed until most of the grape sugar is turned to alcohol. Sugar which escapes this process gives to certain wines, notably port wines, their sweet, fruity flavor, and wines having much sugar in them are known as sweet wines. Such wines as claret, Burgundy, Rhine wine and Moselle contain little or no sugar, while sherry, Madeira, port and champagne contain from two to seven parts in a hundred. Light wines contain relatively little alcohol—from seven to twelve parts in one hundred—and, consequently, are less intoxicating than such wines as port, which contains from fifteen to twenty per cent. Wines are also called white and red, red wines being those in which the skins of the fruit have not been removed during fermentation. The chief vine-growing countries are France, Spain and Italy.

Consult Hirschfeld's *The Standard Handbook on Wines and Liquors.*

**Related Subjects.** The reader may consult the following articles in these volumes:

| | |
|---|---|
| Alcoholic Drinks | Grape |
| Claret | Sherry |

**WINGED BULL,** one of the numerous grotesque creatures of early Assyrian sculpture, dating from about the end of the tenth century B.C. Winged Bulls, with human heads, were placed as sentinels, one on each side of the entrance to the Assyrian palaces. These guardians of the gate, some of which were seventeen feet high, were always represented as advancing. Parts of their body stood out from the wall, the head and breast being outside the arch, while the wings were carved on gigantic plinths which covered the wall. The heads were crowned with high, priestlike tiaras. The Winged Bulls were supposed to frighten away all enemies from the dwelling.

THE WINGED BULL

**WINGED LION,** a bronze lion with wings, surmounting one of the two large columns at the south end of the Piazzetta, an extension of Saint Mark's Square, at Venice. These columns were brought to Venice from Syria in 1172 and erected in honor of two patron saints

of the city. The Winged Lion, cast in 1178, is the emblem of Saint Mark; the crocodile, which surmounts the second column, is sacred to Saint Theodore. The Lion of Saint Mark was taken to France by Napoleon in 1797, but was restored in 1815.

**WINGED VICTORY,** THE, or **NIKE OF SAMOTHRACE,** *ni'ke, sam'o thrays,* one of the world's greatest pieces of sculpture, a possession of the Louvre, in Paris. The *Winged Victory* was discovered in 1862 on the island

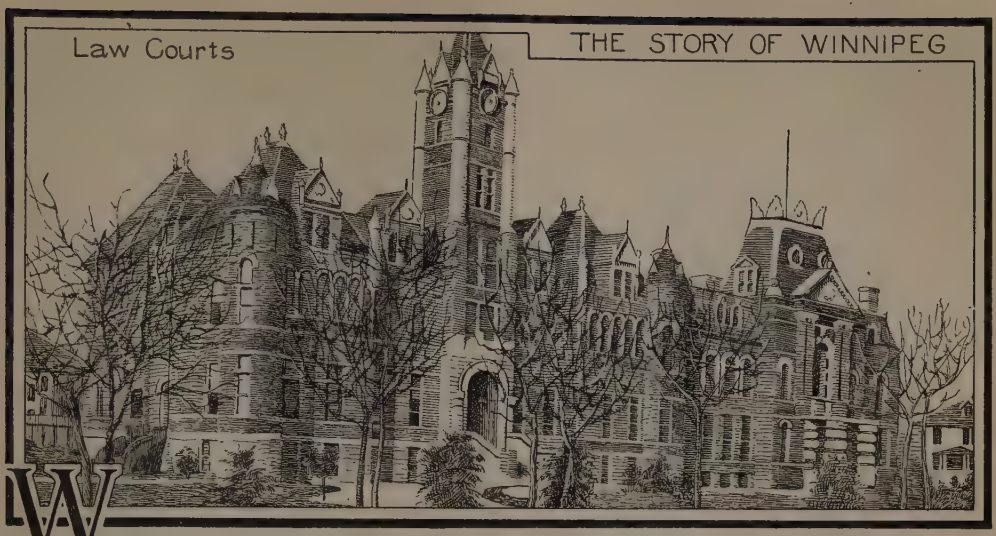
THE *WINGED VICTORY*

of Samothrace, in the Aegean Sea. It is believed that the statue was one of many erected by the Greeks in honor of their successes in war, to Nike, the goddess of victory and the winged messenger of Zeus and Athene. The goddess is represented as standing at the prow of a vessel, with her wings outstretched. The strong wind, which alternately wraps portions of her transparent garment closely about her figure and then sways it in the breeze, indicates the swiftness of the moving ship. When the statue was discovered the wings were separated from the body, and later twenty-six other blocks were found, which proved to be the pedestal. Although it is without head or arms, the figure still gives an effect of majestic beauty and dignity.

**WIN'IFRED,** SAINT, a Welsh heroine of a legend of the seventh century. The story is told that a certain Prince Caradoc courted her unsuccessfully, and, in revenge for her coldness towards him, cut off her head. The head rolled down the hill and into the Church of Saint Bueno, and there a spring appeared. Saint Bueno restored the severed head, and the maiden lived for many years thereafter. The well-known spring of Holywell, in England, is identified with the miraculous spring of the legend. In 1876 the Duke of Westminster leased the spring to the corporation of Holywell for a thousand years.

**WINKELRIED,** *wingk''l reed,* ARNOLD, in Swiss legends a peasant hero through whose bravery Switzerland won its independence. Hundreds of years ago, the story runs, when the Swiss and Austrians were fighting at Sempach, the former were hard pressed. Arnold Winkelried commanded his fellow soldiers to form in wedge-shaped lines behind him, and dashing boldly into the Austrian ranks, stretched out his arms, making his body a target for the hostile spears. His followers rushed into the momentary breach in the line, and fighting hand to hand, drove back the enemy, saving the day for Switzerland and thus securing its independence. Many years later a monument was erected on the battle field to the memory of the fallen hero. Since then the sentry's cry, as he calls the hours of the night, has been, "All is well; remember Arnold of Winkelried!" Like the story of William Tell, this legend is by many regarded as purely mythological, but it well illustrates the courageous spirit of the Swiss, who are among the bravest people of the world.

**WINNEBAGO,** *win e ba'go,* a North American tribe of Siouan Indians, part of whom live on a reservation in Northeastern Nebraska. The others are found among the whites in the vicinity of Lake Winnebago, in Wisconsin, where in former days the tribe had its strongholds. All told, the Winnebago Indians are fewer than 2,000 in number. Originally these Indians depended for food upon wild rice and what they obtained by hunting and fishing. They also practiced farming on a small scale, and knew how to obtain sugar from the maple. The women were skilled in dyeing and weaving. These Indians call themselves *Hochauka;* Winnebago is an Algonquian name, applied to them by white men.




**WINNIPEG,** a city in Manitoba, the capital of the province and the county town of Selkirk County. It is the largest city in the Canadian West, and is the third city in Canada, being exceeded in size only by Montreal and Toronto. From a little trading post of 250 people in 1870, it grew in a brief period to one of the great cities of America. In 1901 Winnipeg had 42,340 inhabitants; in 1911 it had 136,035; and in 1916 it had 163,000. In population it ranks approximately with Columbus and Toledo, Ohio, and Atlanta, Georgia.

Winnipeg lies at the junction of the Red River and its chief tributary, the Assiniboine. It occupies a strategic position in Canada, somewhat similar to that of Chicago in the United States. From Lake Winnipeg on the north to the international boundary on the south is a distance of about 100 miles. Here, through this narrow strip of the prairies must pass all Canadian traffic between east and west. Here, too, in olden days ran the trappers' routes, and to-day the railways follow the same course. Thus it happens that Winnipeg, about midway between Lake Winnipeg and the boundary, is like the neck of a bottle. The great Canadian transcontinental lines (the Canadian Pacific, the Canadian Northern and the Grand Trunk Pacific) must pass through the city. From the south, up the valley, come the Great Northern and the Northern Pacific railways.

First, therefore, Winnipeg is a railroad center, and is a division point for all the great railroads which enter it. The railway shops, either in or near the city, are among its chief industrial establishments. As a railroad center Winnipeg inevitably became a great receiving and distributing point. Grain and other products of the West here meet the coal and manufactures of the East. The wholesale trade of the city in normal times is in excess of $200,000,000 a year. Winnipeg is perhaps the greatest grain market in the world. It also has a large trade in many products of the immediate vicinity of the city, such as wool, flax, hides, glass sands and brick clays. Its bank clearings average a billion dollars a year.

It was inevitable that Winnipeg should become a manufacturing center. At first flour and lumber mills were the only industrial plants, and they are still the most important, but there are now nearly 500 factories, producing almost every conceivable variety of manufactured goods. Slaughtering and packing meats are large items, as are also structural steel and boilers, traction engines and other farm machinery, soap, breakfast foods, clothing, tents, boxes, cement and butter. The annual output of manufactures is about $100,000,000. Electric power is derived from a 60,000-horsepower municipal plant, as well as from a private power plant.

With the exception of a small section around old Fort Garry, Winnipeg is laid out on regular lines. Main Street, the chief business thoroughfare, is the widest in Canada. The Hudson's Bay Company building and the Union Station of the Canadian Northern and Grand Trunk Pacific railways is on Main Street, South, and the Canadian Pacific depot is on Main Street, North. On or near Main

Street are most of the banks, brokers, financial organizations of various kinds, the city hall, the towering Union Bank building, McIntyre and Bon Accord buildings. On Portage Avenue, at right angles to Main Street, are the Post Office, the *Free Press* building, the T. Eaton Company's stores, the Y. M. C. A. and the Aikins Block. Princess Avenue, parallel to Main Street, is the center of the wholesale district. Broadway and Assiniboine Avenue are beautiful residential streets, and there are also many fine homes in Fort Rouge, south of the Assiniboine River. Nearly all residence streets are boulevarded, and there are many parks, of which Assiniboine, River and Elm are most important.

In the central part of the city are many splendid buildings, both private and public. In addition to those already mentioned are the Parliament Building, Government House, the law courts, the University of Manitoba, Manitoba College and Wesley College. Winnipeg has nearly a hundred churches, many of great architectural merit. The schools are noteworthy; nearly all are splendidly housed, and they are remarkable for their excellence as educational institutions. Winnipeg has a general hospital, a deaf and dumb institute and several homes for children and needy women.

**History.** The first settlement on the site of Winnipeg was made by Verandrye in the year 1733. Three-quarters of a century later, in 1811, the Earl of Selkirk began to send settlers to the Red River Valley. On the site of Verandrye's Fort Rouge rose Fort Gibraltar, belonging to the Northwest Company, and near by was Fort Douglas, named for the Earl of Selkirk and owned by the Hudson's Bay Company. After the two companies combined a new fort, named Fort Garry, was built in 1821. This was replaced by a stronger Fort Garry in 1835; of the second fort only a gate now remains. Fort Garry was the scene of Riel's first rebellion (see RED RIVER REBELLION), and was the center of the Red River settlements. The first house on the prairie, outside the fort, was built in 1860, but for a decade the settlement grew slowly. In 1870 Fort Garry had only 250 regular residents. In 1874 it was incorporated as a city, and soon began to grow with amazing rapidity. C.H.B.

**WINNIPEG,** a Canadian lake in the south-central part of the province of Manitoba. It has an area of 9,459 square miles, about one hundred square miles more than the state of Vermont, and with the exception of Great Bear and Great Slave lakes is the largest lake lying wholly in Canada. It is 260 miles long from north to south, and from twenty to sixty miles wide, its greatest width being at the northern end. Like lakes Winnipegosis and Manitoba, which also were once a part of Lake Agassiz of the Glacial Period, Lake Winnipeg is shallow, nowhere exceeding a hundred feet in depth. This condition is responsible for the rapidity with which a breeze roughens the surface of the water. The fisheries on Lake Winnipeg, which are the most important in the province, have an annual yield of $400,000; common whitefish constitutes nearly one-half of the total, and tullibee, a variety of whitefish, nearly one-third.

Lake Winnipeg is a storage reservoir for the waters of one of North America's great river systems, the Saskatchewan-Nelson. The drainage basin of this system comprises 370,000 square miles, or more than one-tenth of the total area of the Dominion of Canada. The largest tributary of this system is the Saskatchewan River, and next in importance are the Red River of the North and the Winnipeg River. The Nelson River, issuing from the north end of Lake Winnipeg, is the outlet for this system into Hudson Bay.

An article on each of these great rivers appears in its alphabetical place in these volumes.

**WINNIPEGOSIS,** *win e pe go' sis,* formerly also called WINNIPEGOOS, is a Canadian lake, in the southwest part of Manitoba. It is directly west of Lake Winnipeg and northwest of Lake Manitoba, into which it drains through Waterhen Lake and Waterhen River. Winnipegosis has an area of 2,086 square miles, or 269 square miles more than Lake Manitoba and about one hundred square miles less than Prince Edward Island. It is shaped somewhat like the figure 7, having its greatest extent from east to west across the northern end. It is 122 miles long and has a maximum width of about twenty miles. The greatest known depth of Lake Winnipegosis is thirty-eight feet, and there are so many shallow places that navigation is possible only for vessels drawing less than ten feet.

Fishing, both in winter and summer, is important on the lake. Whitefish and pike are the principal varieties taken, and the average value of the yearly catch exceeds $100,000. In prehistoric times lakes Winnipegosis, Manitoba and Winnipeg formed a vast single sheet of water, now known to geologists as Lake Agassiz. Lake Winnipegosis was discovered in 1749 by the French-Canadian explorer Pierre de Varennes, Sieur de la Verandrye (1685-1749).

**WINNIPEG RIVER,** one of the large streams which flows into Lake Winnipeg and forms a part of the Saskatchewan-Nelson system. Issuing from the north end of the Lake of the Woods, the Winnipeg flows northwest almost to the Manitoba boundary to meet the English River, its chief tributary, and then continues to the southern end of Lake Winnipeg. The English River is 330 miles long, and drains an area of 20,600 square miles. East of Lake of the Woods, the upper course of the Winnipeg is called Rainy River. Its total length to the head of the Firesteel River is 475 miles, and its drainage basin comprises 44,000 square miles.

**WINO'NA,** MINN., an important shipping point in the southeastern part of the state, and the county seat of Winona County. It is situated on the Mississippi River, twenty-eight miles northwest of La Crosse and 103 miles southeast of Saint Paul, and is served by the Chicago, Milwaukee & Saint Paul, the Chicago Great Western, the Chicago & North Western, the Chicago, Burlington & Quincy and the Green Bay & Western railroads. Steamers ply between Winona and all Mississippi River ports. The place was settled in 1851, organized as a town in 1852 and chartered as a city in 1857. The population in 1910 was 18,583. A Federal estimate for 1917 does not increase this total.

That part of the Mississippi River on which Winona is located is famous for its picturesque scenery. The city is partially surrounded by bluffs of peculiar rock formation—Sugar Loaf and Trempealeau mountains being of especial interest—and a beautiful park extends along the water front. A Federal building, Watkins Administration Building, erected in 1914 at a cost of $275,000, the $300,000 Winona Savings Bank, a courthouse, a city hall and the Roman Catholic Cathedral are among the noteworthy buildings of the city. Winona Seminary, for young women, a state normal school and a public library offer opportunities for advanced education. Winona is one of the largest shipping points for grain in the United States. It also sends out large quantities of lumber, live stock, hay and vegetables, the products of the surrounding country. Flour and lumber mills are the leading industrial establishments, but agricultural implements, patent medicines, malt liquors and flax fiber are also made.

**WINSLOW,** *winz'lo,* JOHN ANCRUM (1811-1873), the American naval officer who was in command of the *Kearsarge* when that ship defeated the Confederate cruiser *Alabama,* in 1864. Winslow was born at Wilmington, S. C. At the age of sixteen he entered the navy as a midshipman, and saw active service during the Mexican War. Having served under Foote in command of the Mississippi flotilla during the first year of the War of Secession, he received a captain's commission in 1862 and was placed in command of the *Kearsarge,* with orders to find and capture the *Alabama,* which was destroying great numbers of Federal merchant ships. In June, 1864, the *Kearsarge* and the *Alabama* fought a decisive battle in the harbor of Cherbourg, France, and the *Alabama* was sunk. Winslow's reward for this service to his country was promotion to the rank of commodore. Congress also passed resolutions giving him a vote of thanks. He was made a rear-admiral in 1870, and for the next two years commanded the Pacific squadron.

**WIN'STON-SA'LEM,** N. C., the county seat of Forsyth County, is an extensive tobacco manufacturing center in the northwestern part of the state, 110 miles west of Raleigh and eighty-three miles northeast of Charlotte. It is served by the Norfolk & Western and the Winston-Salem Southbound railroads. Winston city and Salem town were consolidated in 1913. The combined population in 1910 was 22,700; in 1916, 31,155 (Federal estimate).

Salem, a residential community, was founded by a colony of Moravians in 1766, and was platted according to plans made by Count Zinzendorf. It contains the Salem Female Academy and College (Moravian), founded in 1804. Winston is largely industrial. Winston-Salem has several small parks, a Federal building completed in 1915 at a cost of $250,000, a Carnegie Library and hospitals. Enormous factory buildings are features of the city. Tobacco products constitute the leading manufacture, and other articles of manufacture include knit goods, underwear and hosiery, blankets, wagons, furniture, machinery and harness. A local estimate states the value of the annual output to be $40,000,000. J.L.L.

**WIN'TER,** WILLIAM (1836-1917), an American author and poet, and one of the best-known dramatic critics of his day. He was born in Gloucester, Mass. After graduating from the Harvard Law School he was admitted to the bar in 1857, but refused to try his first case because he preferred to devote himself to literature. In 1859 he removed to New York City and became literary editor of *The Saturday Press,* and from 1865 to 1909 was dramatic critic of the New York *Tribune.* He delivered

his own poem, *The Voice of the Silence,* at the Centennial Exposition in Philadelphia in 1876, and was a frequent contributor to leading magazines and reviews. Several trips abroad resulted in a number of descriptive volumes, which include *Shakespeare's England, Old Shrines and Ivy* and *Gray Days and Gold.* He wrote extensively on dramatic subjects, publishing, among other works, *Henry Irving, The Stage Life of Mary Anderson, Life and Art of Edwin Booth, Life and Art of Joseph Jefferson* and *Vagrant Memories.*

**WIN'TERBERRY,** a name applied to a species of plants belonging to the same family as the holly. The winterberry, which is sometimes known as *black alder,* attains a height of from six to twelve feet. Its attractive berries of bright crimson appear in November, and the branches, laden with their cheerful fruit, are popular as house decorations. Winterberry wreaths will keep their bright color for a long time, if properly dried. The bark is said to have tonic and astringent qualities and has been used as a family remedy for fever.

**WIN'TERGREEN,** a hardy, flowering woodland plant, found in almost all parts of the northern hemisphere, and so named because its leaves remain green all winter. It is a low shrub, with glossy, oval leaves clustered at the top of reddish stems, which bear small white or pink flower balls, and bright scarlet berries. The leaves yield a fragrant, pleasant-tasting oil, which is used extensively as a flavoring for candy, medicine, chewing gum, tooth powders and similar preparations. *Spotted wintergreen* is a handsome species, growing about nine inches high, whose leaves are streaked with white along the veins.

WINTERGREEN
The flowering plant and (*a*) fruit.

**WINTER PAL'ACE,** one of the most interesting buildings in Petrograd, and one of the largest palaces in the world. It dates from 1764, and was built by the Empress Anne. This great structure is on the bank of the Neva River, northeast of the Admiralty. It is 455 feet long, 350 feet wide and 80 feet high, and is so admirably proportioned that it gives an effect both of symmetry and of massiveness. Within there are many suites, halls and galleries, containing valuable collections of painting and sculpture. Portraits of all the sovereigns of the Romanoff family, from Michael Feodorovitch to the deposed Nicholas II, are preserved in a special gallery. There was bitter fighting here in the fall of 1917, at the time of the revolt of the bolsheviki against the provisional government.

**WINTHROP,** *win'thrup,* JOHN (1588-1649), an American colonist, born at Edwardston, in Suffolk, England. He was educated at Trinity College, Cambridge University, and, as a young man of wealth and influence had unusually bright prospects. But his religious beliefs were of the Puritan sort and he felt that he should be with the colonists in America. In 1629 the London proprietors of the Massachusetts Company appointed him governor of the New England colony, and in June, 1630, he arrived at Salem, Mass., with 900 emigrants. From that time until his death he was continuously either governor or deputy-governor, and he worked with extraordinary energy for not only the religious but the commercial betterment of the settlement.

He was one of the founders of Boston, organized in 1643 the New England Confederation and served as its first president. He bitterly opposed the doctrines of Anne Hutchinson, and was one of the leaders in driving her from the colony. His *Journal,* telling of New England events down to 1649, is considered one of the most valuable source books in American history; it is a treasure house of information on colonial manners, domestic life, church activities and religious and political views. Winthrop died at Boston, and was buried in that city.

**WINTHROP,** MASS., a popular beach resort and a residential town five miles northeast of Boston, on the Boston, Revere Beach & Lynn Road. Originally it was a part of Boston, then of Chelsea, and later of North Chelsea; in 1852 it was incorporated independently. It has a number of attractive hotels and Winthrop Shore Reservation, a beautiful promenade along the beach; there are fine facilities for bathing, boating and yachting, and there is a park and a public library. Winthrop also has features of historical interest; among them are Dean Winthrop House, built in 1649, Fort Heath and Fort Banks. In 1910 the population

was 10,132; in 1916 it was 12,692 (Federal estimate).

**WIRE,** a long, thin rod of metal, usually round, having a great variety of industrial uses. Telephone and telegraph wires, trolley wires, nails, fences, various kinds of screening devices and strings for musical and scientific instruments are some of the important articles manufactured from wire. Only such metals as are ductile, that is, have the property of being drawn out, are suitable for making wire; the principal ones are silver, copper, iron, platinum, gold and aluminum, with their alloys. Platinum is employed for the wires of extreme fineness used in telescopes; such wires have been drawn to a diameter of one-fifty-thousandth of an inch.

**Process of Manufacture.** Wire was once produced by hammering metal laboriously into plates, which were then cut into strips and rounded by beating. Machines have now entirely superseded hand labor. Steel or iron billets are put through a rolling process, from which they emerge as long rods about a quarter of an inch in diameter. These rods are wound on reels while still hot, and are cleansed, first in a bath of sulphuric acid and later in water.

The making of wire consists essentially in drawing such rods to a still smaller diameter, and this is accomplished by putting them through a series of steel dies. The die has the shape of a funnel with a round vent smaller than the rod. The rod is sharpened at one end by hammering, so that it may be run into the die much as a strand or two of thread is run into the eye of a needle. As soon as it is passed through the die, the sharpened end is seized with a pair of pincers and drawn far enough to be attached to an upright drum, which rotates on a vertical shaft. This drum is then set in motion, and the wire is pulled through the die and wound on the drum. The process of drawing has a tendency to harden wire, so that it has to be softened and rendered less brittle by being placed in cast-iron pots and subjected to heat. This process is called *annealing.* Each time wire is so annealed it has a tendency to scale and must be subjected to an acid bath for cleaning. Wire which is to be used in making nails is not softened in this way, as it would not have sufficient hardness.

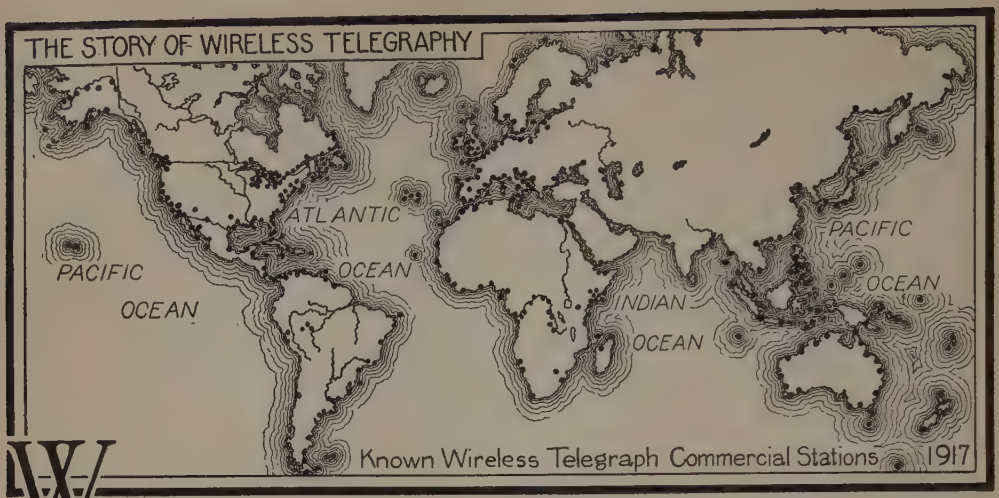
Steel cables having a tensile strength of 130 tons to the square inch have been produced of late years. Such wire is hardened and tempered before being drawn. Commercially, wire is distinguished by its gauge; it varies from No. 0000, which is .46 inches, to No. 36, which is .005 inches. The shape may be square, oval, flat, triangular, etc., but is usually round. For drawing the finest kinds of wire, extremely hard dies of diamonds and rubies are used.

Much of the wire used for fencing is *barbed.* Such wire consists of two or more wires, twisted together and having short, thornlike projections at frequent intervals, or of a single wire furnished with sharp points. It makes a very effective barrier. Barbed wire is another American invention which was employed effectively by all armies in the War of the Nations in Europe. It was stretched between opposing trench systems in a veritable network, to hinder or prevent an enemy attack. Sometimes it was heavily charged with electricity. In 1916 it was declared that 200,000 miles of barbed wire had been used within one year for this purpose. All wires used for fencing, together with telephone, telegraph and trolley wires, are galvanized to prevent rusting when exposed to the weather (see GALVANIZED IRON).

Consult Smith's *Wire: Its Manufacture and Uses.*

**WIRE GLASS,** a combination of wire and glass largely used in window construction in those parts of modern buildings most exposed to danger of fire and robbery. The invention of wire glass is attributed to two men, Frank Shuman of Philadelphia and Leon Appert of France; they achieved practically the same result by different processes. The Appert process consists of rolling one sheet of glass, laying the meshed wire on it and then rolling another sheet of glass on the top, pressing the wire and the sheets of glass into one solid sheet. The Shuman process consists of rolling one sheet of glass, into which the wire netting is pressed and rolled. The strength of the glass is greatly increased by the introduction of the wire, the ingress of light is not affected, and on account of its greater strength wire glass may be safely used where ordinary glass would be broken.

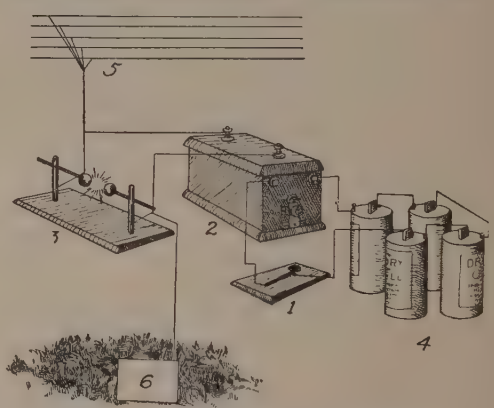
As a fire retardant, wire glass has particular value, for if broken or cracked it seldom falls, but holds its place, preventing the entrance of air which might fan the flames. Wire glass may be finished smooth and polished to resemble plate glass, or it may be ribbed, "rough rolled," or paned, according to taste. The use of wire glass is steadily increasing in all fireproof buildings and effects a great saving in weight of material. It does not present as good an appearance as ordinary glass, so its use is limited to side and rear windows.




**WIRELESS TELEGRAPH,** *tel'e graf,* an invention which many scientists rank as the greatest marvel of inventive genius, with the possible exception of the wireless telephone. Its name properly defines it. It is an electric telegraph which has no connecting wires between sending and receiving stations. The electric impulse travels through the air in every direction. There is not the secrecy possible that can be commanded in messages over telegraph wires, for within a given radius any receiving instrument "tuned" to receive wave impulses of certain lengths can catch a wireless message. This is explained later in the present article. This unavoidable publicity is overcome in necessary cases by the use of code words which mean nothing to persons who cannot interpret them.

Perfection in mechanism, which has resulted in extending the area of communication, has been very rapid. The earliest wireless device could send messages but a few miles, and then only under most favorable weather conditions. When the first "wireless" connection was made across the narrowest part of the Atlantic, between Newfoundland and Ireland, less than 2,000 miles, the world marveled; to-day one would not be surprised at the announcement that powerful impulses have been transmitted around the world. Already messages from Alaska have been "picked up" at Key West, Florida, under very favorable conditions, and a dispatch from Hawaii has been read at the powerful station at Arlington Heights, opposite Washington, D. C. The average range for equipment of the first class, however, is not greater than 1,000 to 1,500 miles. Many instruments will not "carry" farther than 100 miles. (See comment, with illustration of Arlington station, in this article.)

That the art of wireless telegraphy is easily mastered is shown by the fact that not only men but thousands of boys not over eighteen years of age have installed systems in their homes and have become expert operators. When the War of the Nations involved the United States, in April, 1917, the government was obliged to order all private systems dismantled in order that official secrets might not reach enemy sympathizers. It was found that




SIMPLEST PRACTICAL TRANSMITTER

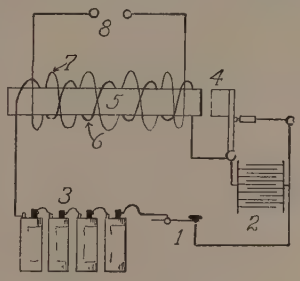
(1) Key
(2) Induction coil
(3) Spark gap
(4) Battery
(5) Aërial
(6) Copper plate in ground

nearly 200 private stations existed in Chicago alone.

**Description of Equipment.** The simplest form of wireless telegraph sending equipment consists of an induction coil (spark coil) with

one knob connected to an aërial, or overhead, wire and the other knob connected by a wire to the ground or to metal pipes, such as gas pipes, leading into the ground. A battery or other source of electric current must be connected to the primary winding of the induction coil, and a key, such as a telegraph key, used for making and breaking the circuit. The simplest wireless receiving set consists of an electric circuit in which a battery current flows through some form of detector (see below) which is sensitive to the electric waves. There must be in the battery circuit some instrument, such as a telephone receiver, which will produce a sound when the current is made stronger or weaker. A simple outfit such as described above can be used to send messages a mile or more even with a small spark coil.

A small but complete wireless telegraph station which may be built at home consists of the parts named above, with a switch arranged to throw the aërial into the sending or receiving circuit as desired. The receiving and transmitting apparatus cannot be connected to the aërial and ground wires at the same time, because the powerful currents of the transmitter would injure the receiver. A system has been devised for enabling the operator to send and receive at the same time. In this system the transmitting key is provided with a second set of contacts, so that between the dots and dashes the aërial and ground wires are automatically connected to the receiving apparatus. This is called a "breaking-in-system," because it enables an operator to "break-in" when receiving a message without waiting until the message is completed and ask to have certain parts repeated.



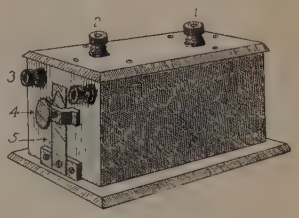

INDUCTION COIL

(1) Key
(2) Condenser
(3) Battery
(4) Interrupter
(5) Core
(6) Primary
(7) Secondary
(8) Spark gap

The more powerful the spark coil and the higher the aërial the farther a message can be sent. An amateur can usually receive messages from a much greater distance than that over which he can send, for the reason that it is a simpler matter and less expensive to set up a long-distance receiving set than it is to set up a long-distance sending outfit.

**Detectors.** The detector is the part of a receiving outfit that is sensitive to electric waves. Various forms of detectors are employed, and of these the following are most generally used:

*The crystal detector* is one of the simplest and most efficient. Crystals of silicon are among those commonly used. The crystal is placed between two metal electrodes, the contact between the crystal and one of the metals being loose, a screw being used to regulate the pressure of this loose contact.



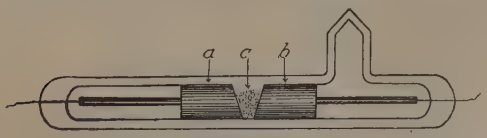

INDUCTION COIL ENCLOSED

(1) Secondary terminal
(2) Secondary terminal
(3) Primary
(4) Adjusting screw
(5) Spring

The electric waves cause a rapid surging back and forth of electricity through the aërial and through the detector. This is called an *oscillation.* It is a form of alternating current. While the electricity is surging back and forth, trying to go first in one direction then in the opposite through the detector, the crystal then permits the electric charge to go through in one direction and refuses to permit it to go in the opposite direction. Thus the current becomes direct, flowing only in one direction, but is not a uniform current. It is pulsating, flowing and then ceasing to flow with each wave. If this pulsating current flows through a telephone receiver it causes a buzzing sound. The oscillation could not directly affect the receiver, because it is of such high frequency that it would be choked out by self-induction in the coils of the receiver, but there is no choking effect with the direct pulsating current. Some crystals that are used are silicon, carborundum, iron pyrites, copper pyrites, galena and zincite. The silicon detector is one of the best.

*The coherer* is the form of detector first used by Marconi. The coherer consists of two metal plugs, preferably of silver, fitted in a glass tube with a small space between them, this space being filled with fine filings of nickel and silver. Wires for electrical connection lead out from the plugs. The air is pumped out of the tube, and the tube is sealed. The electric oscillations set up by the electric waves cause the filings to cohere, or cling together more closely. Instead of one loose contact, as in the crystal detector, we now have many loose contacts between the filings. A battery current flows through the

coherer. When the filings cohere the effect is like that of tightening any loose contact—the current becomes stronger. Thus, when the electric waves pass over the instrument the coherer causes the battery current to become

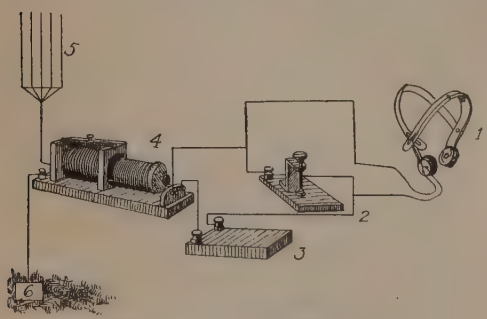



COHERER
(*a*) Electrode; (*b*) filings; (*c*) electrode.

stronger. A tapper then jars the filings so that they are loosened again and the battery current becomes weaker, becomes, in fact, practically no current. The coherer thus acts practically as a "make-and-break" in the battery circuit, the "make-and-break" being operated by the electric waves. The battery current can be made to operate a telegraph sounder or to produce a clicking sound in a telephone receiver.

*Electrolytic detectors* are those that depend on electrolysis. There are two principal forms, the DeForest and the Fessenden, named for their inventors:

The DeForest detector consists of a tube containing two metal plugs or electrodes, and between the electrodes a paste of litharge and glycerine or vaseline mixed with water or alcohol and a few metal filings. This detector acts in the opposite way from a coherer. Under ordinary circumstances a good connection is made by electrolysis, the electrodes being con-




RECEIVING APPARATUS
(1) Receivers for ears
(2) Detector
(3) Fixed Condenser
(4) Loose coupler
(5) Aërial
(6) Copper plate in ground

nected by a "lead tree" (see ELECTROLYSIS). The electric waves break this connection.

The electrolytic detector used in the Fessenden system consists of two fine platinum wires dipping into a liquid. Nitric acid has been found best for signaling. The wires and the acid form an electrolytic cell, to which a battery is connected. The acid quickly stops the battery current, probably on account of polarization. The electric waves cause a sudden rush of the battery current through the acid.

*The magnetic detector* used in the Marconi system was invented by Marconi. In this detector a band made of fine iron wire is kept running on two wooden pulleys at the rate of about three inches per second. Two horseshoe magnets with two like poles together (as two north poles) are supported above one side of this band. Directly beneath the two magnet poles just mentioned the wire band runs through a glass tube. On this glass tube are wound two coils of wire. One of these coils is connected to the aërial and the ground; the other is connected to a telephone receiver. The wire is magnetized by the action of the horseshoe magnets as it travels along.

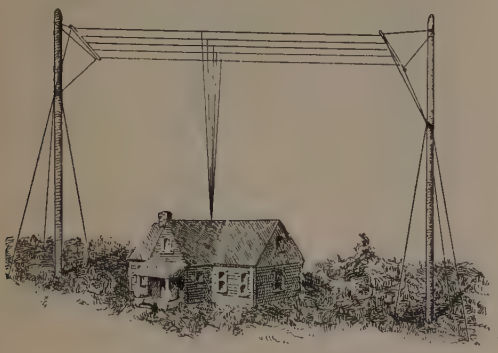
We should expect to find a south magnet pole directly beneath the two north poles of the magnets. This would be so were it not for the fact that it requires a little time to magnetize iron; therefore, by the time this part of the wire becomes a south pole it has traveled a little beyond the magnets.

Now, suppose the electric waves pass over the aërial. An oscillation, that is, a rapidly alternating current, is produced in the aërial and in the coil to which it is connected. This rapidly alternating current has the same effect on the iron as a sharp blow with a hammer would have (see MAGNET AND MAGNETISM). It shakes up the molecules of iron so that the iron quickly takes on the magnetism induced by the horseshoe magnets. The south pole in the wire then jumps back to a position directly beneath the north poles of the magnets; thus, the electric waves cause a change in the magnetism of the iron wire. Now the coil connected to the telephone receiver feels this magnetic change, and a current is induced in this coil (see INDUCTION, ELECTRIC), and this current flowing through the receiver causes a click. When the waves cease the south pole in the wire jumps back to its former position and another click is produced.

Another form of detector, the glowlamp detector, is described under WIRELESS TELEPHONE.

**Aërials.** The aërial consists of a wire or a number of wires suspended in the air, hence its name. It is in the aërial that an electric surging, or an electric oscillation, is set up by the electric waves. The aërial furnishes a large conducting surface to catch the waves in re-

ceiving and a large surface from which the waves go out in sending. A common form of aërial is shown in the illustration. This is the horizontal form, and is used on ships and on land when it can be placed on a high elevation, such as the roof of a tall building.



A COMMON FORM OF AËRIAL

Four or five wires are commonly used for a horizontal aërial. The leading-in wire may be connected either to the middle or to one end of the horizontal wires. Vertical aërials composed of a large number of wires supported by high towers are used by some wireless stations for long distance signalling. The greater the height of the aërial the greater is the distance through which the station can operate. Marconi in his early experiments thought that doubling the height of the aërial made the sending distance four times as great, but later found that this does not quite hold true for great heights. Aërials are usually made of strands of phosphor-bronze wire, but for amateur work No. 12 copper wire can be used. The wires must be insulated at all supporting points.

**Spark Coils.** The spark coil used in wireless telegraphy is an induction coil. Induction coils for wireless telegraphy have the secondary winding of larger wire than other induction coils, such, for example, as those used in producing X-rays. The secondary winding, therefore, has less resistance than in other induction coils, permitting a stronger flow of electricity with each discharge and producing what is known as a "hot spark." This means that for a given length of spark more energy is given off than with other kinds of induction coil. The length of spark depends on voltage only. If the reader will recall that electric power equals volts times amperes, he will see that since the spark coil used in wireless telegraphy has higher amperage it has more power for the same voltage, that is, for the same length of spark, than other induction coils. Both high voltage and high amperage are used in coils for wireless telegraphy.

INSULATION OF AËRIAL

**Transformers.** For long distance signalling, for example, signalling across the Atlantic Ocean, the spark coil operated by means of a current from a battery does not furnish sufficient power. For such work an alternating current and a transformer are required. Alternating current with an electromotive force of about 2,000 volts is supplied to the primary of the transformer, and the secondary gives out an electromotive force of 20,000 volts or more. The terminals of the secondary coil constitute the spark gap.

**Interrupters.** The interrupter for wireless telegraphy must work at high speed, and the break must be as nearly instantaneous as possible. The spring interrupter used with the experimental induction coil does not meet requirements except for coils under two-inch spark; a double spring interrupter may be used for somewhat higher power. Generally the interrupter is separate from the coil. There are a number of interrupters in which a small electric motor operates the contacts. The *electrolytic interrupter* consists of a platinum anode and a lead cathode, dipping in a solution of sulphuric acid in water. As the current flows through the acid, bubbles of hydrogen collect on the platinum, stopping the current. The bubbles then disappear, allowing the current to flow. With high voltage this operation takes place and is repeated very rapidly.

A number of different forms of *mercury interrupters* are in use, and these depend on the fact that mercury is a conductor of electricity. A jet of mercury strikes a metal plate, and the interruptions are produced by the metal plate moving out of contact with the jet of mercury.

Interrupters are used, of course, only when a direct current is used for the primary coil. When an alternating current is used in the primary no interrupter is needed, for the alternations of current in the primary take the place of the interrupter.

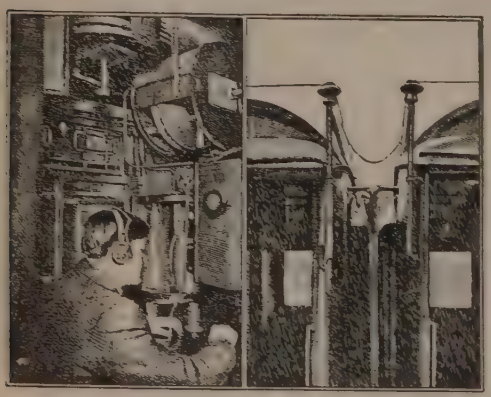
**Condensers.** Condensers are included in every wireless equipment for the purpose of increasing the strength of the spark. The con-

denser is connected across the spark gap. Glass is the substance most commonly used as the dielectric between the metal plates of the condenser. The most common form of condenser in which glass is used is the Leyden jar. Another form consists of glass plates coated with tin foil and placed in a suitable rack.

**Tuning.** Every electric spark sends out waves of a definite length; the length of the waves depends on the size of the spark coil used and on the amount of capacity in the circuit. A tuned receiving set receives waves of one length, but is not affected by waves of other lengths.

A violin may be used as an illustration of what is meant by tuning. If two violins are fastened firmly on a table near to each other and a string of one is vigorously bowed, the string of the same pitch on the other violin will be set in vibration and give out a sound. The sound vibrations traveling through the table set in vibration one string, and only one, on the second violin, because only one of those strings is in tune with the string that is being bowed. If the second violin has no string in tune with the string of the first it will not receive the message, and there will be no responding sound. It is the same in wireless telegraphy. The receiving instrument must be in tune with the sending instrument; that is, it must be of the same pitch, or respond to waves of the same length as those of the sending instrument.

There are "untuned" receiving circuits. These can be illustrated by a tuning fork and a table.



ON RAILWAY TRAINS
At left, the operator at work; at right, the aërial.

If a tuning fork is struck and placed on a table while it is vibrating, the table will give out a loud sound of the same pitch as that of the fork, no matter what pitch it may be. The table does not have to be tuned. The vibrations of the table are called forced vibrations, because the tuning fork forces the table to vibrate in unison with itself. Some receiving sets are like the table; they do not require tuning, and their vibrations are forced vibrations.

*A tuning coil* is used for the purpose of setting the receiving instruments to the same wave length as the sending instruments. A tuning coil is used also in connection with the sending device, to regulate the length of wave sent out. The tuning coil for receiving consists of many turns of fine wire; the one for sending consists of a few turns of very heavy wire, and is usually called simply a *helix*. Sliding contacts are used to throw more or fewer turns of the coil into the circuit. The length of wave is increased by throwing more turns of wire into the circuit. This increases the self-induction of the circuit.

Two circuits are in tune when they are adapted to send and receive waves of the same length. If a wireless operator discovers that the signals which he receives from a certain station are weak, he may find that by lengthening or shortening his aërial the signals will be stronger; with this length of aërial his receiving circuit would be in tune with the circuit of the sending station. It would be inconvenient to lengthen or shorten the aërial every time he wished to tune his circuit with that of a different station. To avoid this difficulty the tuning coil is used. Introducing more turns of the tuning coil into the circuit has the same effect as lengthening the aërial so that longer waves can be received. This effect is due to self-induction. Increasing the self-induction increases the wave length. The aërial also has a certain capacity, like the capacity of a condenser. The length of the waves depends on both the self-induction and the capacity of the circuit. If the capacity is increased then to retain the same wave length the self-induction must be correspondingly reduced. To produce the same wave length the product of self-induction and capacity must be kept the same.

**Codes.** Two codes are in use in wireless telegraphy, the Morse and the Continental. The Continental code is used in Great Britain and its colonies and by all ocean liners except those that ply the American coast. The Morse code is used in the United States. The two codes are given in the article TELEGRAPH.

**Electric Waves and Their Discovery.** Light and electric waves are alike, except that electric waves are longer than light waves. The

sun sends to the earth electric waves as well as light waves, but we are blind so far as electric waves are concerned; our eyes cannot perceive them. Such waves are sent out not only by the sun but by every stroke of lightning

ARLINGTON NAVAL STATION

From Arlington, across the Potomac River from Washington, the government sends its wireless messages to American warships on duty at sea, and to this station navy vessels send their reports. The Arlington station is the most powerful in the world, with a range of 3,000 miles over water. One of its towers is 600 feet high, the other two 450 feet each.

and every spark from an electric machine or induction coil; yet for centuries men did not know of the existence of this peculiar kind of light. It was James Clerk Maxwell in England who first stated that there are such waves, yet Maxwell was unable to detect them. He could only prove by mathematics that such waves exist, and that they travel with the same speed as light. It was Heinrich Hertz, in Germany, who first invented a detector to reveal these waves to the human eye and ear. The detector made by Hertz was the beginning of wireless telegraphy, though like the beginning of most inventions it was too crude for practical use. The coherer described above was invented by Edward Branly in Paris in 1890. In 1894 Marconi in Italy began his experiments which led to the practical wireless telegraph.

**Uses of Wireless Telegraphy.** Perhaps the most important use of wireless telegraphy is that of sending messages across the sea and to and from ships at sea. In saving life in disasters at sea by calling relief to sinking vessels wireless telegraphy has been of service beyond estimation. The disasters to the *Republic*, the *Titanic*, the *Monroe* and the *Empress of Ireland* serve as recent instances in which the loss of life would have been more appalling but for the call of distress heard over leagues of stormy seas. It is used also to a large extent in sending commercial messages overland. This is true particularly between important centers, to relieve the congestion of the wire telegraph service, and after storms, when telegraph wires are down. Another important use of the wireless telegraph is the combination of the wireless with an aëroplane. The aëroplane carries an aviator and a wireless operator. In the War of the Nations aëroplanes so equipped observed the enemy and kept commanding officers informed as to his movements. E.E.B.

*Consult Pierce's Principles of Wireless Telegraphy; Senneck's Wireless Telegraphy; Eccles' Wireless Telegraphy and Telephony.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Battery | Induction Coil |
| Current, Electric | Leyden Jar |
| Electricity | Magnet and Magnetism |
| Electrode | Telegraph, subhead *The Codes* |
| Electrolysis | |
| Induction, Electric | |


**WIRELESS TELEPHONE,** *tel'e fon,* a device by which the sounds uttered by the human voice can be transmitted hundreds of miles without any medium of transmission except the air. To be told that a person in possession of the proper mechanism may in any place of his choosing converse with a friend similarly equipped, wherever he may be, within reasonable distance, seems like a fairy tale. Yet the feat has been accomplished. Much of the pioneer work in the development of this device is to the credit of Guglielmo Marconi.

One method of producing electric waves suitable for wireless telephony is by means of an electric arc. The arc is operated by a direct current and takes the place of the spark gap of the wireless telegraph (which see), but a special arrangement is needed to cause an electric arc to send out electric waves. A condenser and a coil having self-induction (see CURRENT, ELECTRIC) must be connected across the terminals of the arc. The theory is that when the circuit is completed across the arc

electricity rushes into the condenser to charge it; some of the current is thus taken away from the arc by the condenser. When the condenser is fully charged it discharges back through the arc, and thus electricity surges back and forth into and out of the condenser and likewise across the arc. This surging back and forth of electricity is called an *oscillation,* and every electric oscillation sends out waves in the ether (see ELECTRICITY). The waves in this instance are uniform, because the oscillations are equal in every respect. Such an arc produces a musical note and is, therefore, sometimes called a singing arc; since it is used in the transmission of speech, it is also called a speaking arc.

**Early Attempts.** An early form of wireless telephone employed the speaking arc, with a reflector which projected the light of the arc like the beam of a searchlight. Along this beam of light speech was transmitted, that is, the beam of light transmitted the impulses which reproduced the speech. The receiving device consisted of a number of strips of selenium (an element whose electrical resistance is changed by the action of light), a telephone receiver and a battery. As the light from the speaking arc fell upon the selenium the battery current varied in strength to correspond with the changes in the sound from the arc. This changing current produced the same sounds in the receiver. Speech could be transmitted by this means as far as a beam from a searchlight could be projected.

While the earlier wireless telephones used a beam of light, the modern wireless telephone makes use of a stream of electric waves which are like light waves in every respect except that they are longer. The short light waves can be used only for short distances because they are checked by many objects through which the longer electric waves can readily pass. For example, electric waves can go through a brick wall, but light cannot do so.

**Theory of the Wireless Telephone.** The number of oscillations per second produced by the musical arc varies from about 75,000 to 100,000. An equal number of electric waves go out from the antenna, or aërial, in all directions. At the receiving station these waves produce oscillations in the receiving antenna similar to those of the sending antenna. The oscillations at the receiving station pass through the coil of a telephone receiver. Whenever an electric oscillation, that is, an alternating current, passes through the coil of a telephone receiver it causes the diaphragm to vibrate; hence, the continuous stream of electric waves produces vibrations in the receiver, but they are so rapid that they produce no sound that can be heard. The reason is that the human ear cannot hear a sound which consists of more than about 20,000 vibrations per second, while the musical arc gives out, as has been stated, 75,000 or more electric oscillations per second. The stream of electric waves going out from the sending station serves the same purpose as the electric current which flows along the line of the wire telephone.

**Telegraph and Telephone Contrasted.** In the wire telegraph the circuit is made and broken for every dot or dash, so the telegraph current may be called an interrupted current, the key making and breaking the circuit. On the contrary the telephone current is not interrupted. When a person is talking over the wire telephone a current (alternating) must flow constantly over the line wire. The sound of the voice does not make and break the circuit, but it changes the strength of the current and the rate of alternation. There is the same difference between the wireless telegraph and the wireless telephone. In the wireless telegraph the stream of electric waves is interrupted for every dot or dash, while in the wireless telephone the stream of electric waves flows constantly when the telephone is in service. The sound of the voice varies the strength, the form and the length of the waves. Just as the alternating current in the wire telephone varies in strength and rate of vibration to correspond to all the variations in the voice, so does the stream of electric waves of the wireless telephone vary in form, strength and number per second, to correspond to all the variations in quality, loudness and pitch of the voice.

It is for this reason that the transmitters of the wireless telegraph and of the wireless telephone differ. The spark coil of the wireless telegraph sends out an interrupted stream of electric waves; each spark discharge sends out a stream of waves that fade out, as the sound of a bell, which when struck once, gradually dies away. On the other hand, the waves from the speaking arc do not fade out, but continue of the same strength as long as the current flows across the arc, except as their strength is varied by the sound of the voice acting upon the transmitter.

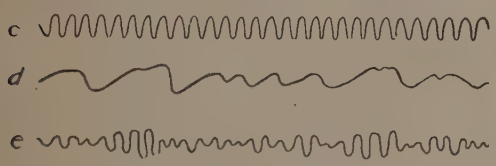
Each spark of the wireless telegraph spark coil consists in reality of a series of sparks. When the key is pressed the interrupter rapidly

makes and breaks the circuit, or, if a transformer is used, the alternations produce a corresponding effect, for at the end of each alternation the current dies down to zero. At each interruption or reversal of the primary current

FIGURES A AND B

the electric waves that are being sent out die down to zero. This may happen with an ordinary spark coil a hundred or more times a second; there would be just that many interruptions to the sound of the voice if a person were to attempt to use a spark coil for wireless telephony.

The electric waves sent out by a spark coil or transformer may be represented by a broken wave line, as in *a* in the illustration. The waves of the speaking arc are uniform and uninterrupted, as in *b*. While the electric oscillations produce vibrations in the receiver that are so rapid that the ear cannot detect them, the sound of the voice modifies these oscillations so that they produce slower vibrations in the receiver. In the illustration *d* represents the

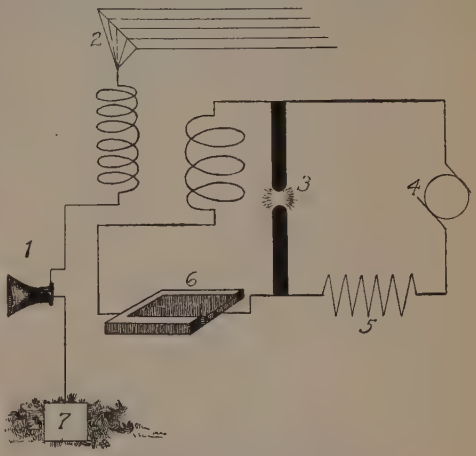



FIGURES C, D, E

sound waves and *e* the electric waves as modified by the sound waves. If the interrupted waves of the spark coil were used to transmit speech, the sound would also be interrupted, as shown in *b*.

**The Transmitter.** The carbon granule or microphone transmitter (see TELEPHONE) is used in nearly all systems of wireless telephony; this is the same form of transmitter as that used in the wire telephone. The oscillations produced by the speaking arc flow through the carbon granules as the battery current flows through the carbon granules of the wire telephone transmitter. When a person speaks into the transmitter the diaphragm which presses against the carbon granules is set in vibration. As the diaphragm vibrates, it varies the pressure on the carbon granules. When the pressure is increased a stronger charge can surge through the carbon granules; when the pressure is reduced the oscillations are made weaker. The transmitter, therefore, acts in the same way toward the electric oscillations as the wire telephone transmitter acts toward the battery current which flows through it. As the oscillations are made alternately stronger and weaker by the sound waves acting upon the diaphragm, the electric waves going out from the aërial are alternately stronger and weaker, and the changes in the electric waves correspond perfectly to the sound waves. This stream of electric waves changing with the sound of the voice transmits the message as does the alternating current in the wire telephone.

It is probable that the electric oscillations set up in the earth by the transmitter aid in




TRANSMITTING SYSTEM

(1) Telephone transmitter
(2) Aërial
(3) Arc
(4) Dynamo
(5) Reactance
(6) Condenser
(7) Copper plate in ground

producing the effect upon the receiver, both in wireless telegraphy and wireless telephony. The grounding of the wires at both stations is necessary for long-distance transmission, and the condition of the earth between the two stations, whether moist or dry, has a marked effect on the transmission.

The power required for the wireless telephone is much greater than for the wire telephone. The reason is that with wireless transmission the electric energy goes out in all directions and much of it is lost. Because so much greater power is required a specially constructed transmitter must be used, one that will not be injured by the strong currents that surge through it.

For the sake of simplicity we have assumed that the oscillations from the arc flow through

the transmitter. As a matter of fact in most systems the oscillations from the arc flow through the primary coil of a transformer, and the oscillations from the secondary coil flow through the transmitter and the antenna. The transformer is for the purpose of increasing the electric pressure which produces the oscillations.

**Detectors.** A receiver of the same form as that of the wire telephone is used, but there must be in the circuit with the receiver a detector which is sensitive to the strength or amplitude of the electric waves. A coherer cannot be used because if such a detector responds at all it produces the same effect for weak as for strong waves.

*Glowlamp Detectors.* A very sensitive detector which is used in most wireless telephone systems is in the form of a glowlamp. A simple experiment illustrates the principle of this detector. If a gas flame is made part of the circuit of an electric battery and the circuit includes also an induction coil connected to a telephone receiver, then when a stream of electric waves comes along there is a click in the receiver. The waves change the resistance of the flame and so change the strength of the current. The heated gas in the flame responds to the electric waves.

The Fleming oscillation valve and the DeForest audion are the most common forms of glowlamp detectors. In each of these the small amount of gas remaining in an incandescent bulb takes the place of the flame in the experiment described above. In addition to the incandescent filament there must be in the bulb either a single plate or a cylinder of metal, as in the Fleming detector, or a plate and a "grid" of metal, as in the DeForest audion. The filament is made white hot by a current from a storage battery. The small amount of gas which remains in the bulb is ionized, that is, the molecules of gas are separated into positively and negatively charged ions (see Ion). This ionized gas permits the oscillations in the aërial to flow only one way through the glowlamp, that is, from the metal to the white-hot filament, the metal being always positive. The ionized gas is also very sensitive to changes in the strength or amplitude of the electric oscillations. Thus it is that the current from the glowlamp detector flowing through a telephone receiver reproduces perfectly the sounds that act upon the transmitter.

*Crystal Detectors.* Crystal detectors which rectify the oscillations, that is, permit the current to flow in one direction only, may be used in wireless telephony.

*Fessenden Detector.* The Fessenden detector consists of two coils of wire, one of which is wound on an iron wire core and connected to the antenna. The other is attached to a mica diaphragm and has an alternating current flowing through it of the same frequency as that of the transmitter. The attraction between these two coils varies as the electric oscillations vary; this causes the mica diaphragm to vibrate and reproduce the sound which acts upon the transmitter. This is the only form of receiver in which the oscillations produced in the aërial flow directly through the coil of the telephone receiver. (See Wireless Telegraph, subhead *Detectors.*)

**Comparison with Wire Telephone.** In the wire telephone the electric current which transmits the message is guided by the wire, while in the wireless telephone the electric waves go out in all directions from the sending station. The electric waves may be detected by any station having a properly tuned receiver. By a system of tuning (see Wireless Telegraph) it is possible to connect a number of receivers to one aërial and receive a number of messages at the same time.

The wireless telephone reproduces sounds with greater accuracy and with better articulation than does the wire telephone. The reason is that, as a rule, the variations in the electric current are slightly modified by the wire on account of induction. There is no such action in the case of the wireless telephone, so the waves arrive unchanged at the receiving station. For this reason sounds heard in the wireless telephone receiver are particularly sharp and clear and free from the buzzing that often disturbs conversation over the wire telephone.

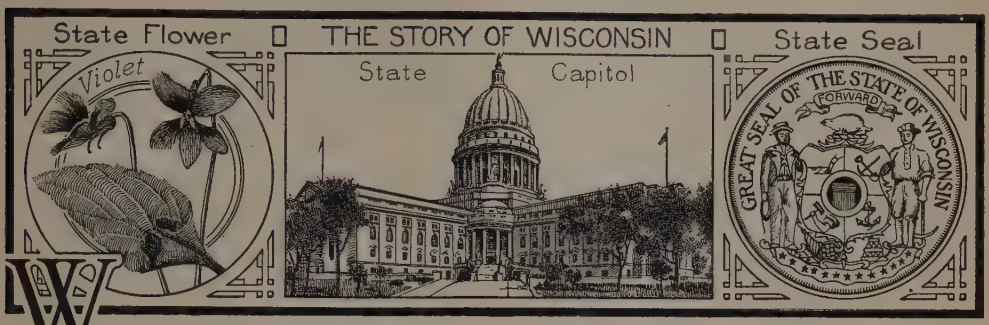
Lightning sends out electromagnetic waves which have a disturbing effect upon the wireless receiver. These waves produce sounds in the receiver which interfere with the receiving of messages unless special means are employed to prevent such interference. This is true to such an extent that a wireless operator can often predict a thunderstorm some hours in advance of its arrival. E.E.B.

Consult Eccles' *Wireless Telegraphy and Telephony;* Fleming's *Principles of Electric Wave Telegraphy and Telephony.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

Current, Electric — Telephone
Electricity — Wireless Telegraph

**WIRE'WORM,** the name applied to the hard-skinned, cylindrical grubs of click beetles, which live in the earth, usually two or three years, often doing great damage to crops by feeding on the plant roots. They can be exterminated, though with difficulty, by treating the soil to clear it of insects before seeds are sown, and by rotation of crops. For an illustration of the wireworm, see the article CLICK BEETLE, page 1428.




**WISCONSIN,** *wis kon' sin,* one of the north-central states of the American Union, popularly known as the BADGER STATE, from the animal formerly abundant in its northern woods. The state is named for its principal river, the Wisconsin. The word is of Indian origin, and its probable meaning is "wild and rushing river," or "gathering of the waters;" another meaning sometimes given is "great rocks." The state has adopted the violet of its woody dells as its flower emblem.

Wisconsin was the northernmost and last state formed from the Northwest Territory, and its situation proved to be of great commercial significance. It is bounded by America's two greatest inland highways for water traffic; the Mississippi and its tributary, the Saint Croix, form all but about forty miles of the western boundary, and Lake Superior and Lake Michigan, of the Great Lakes and Saint Lawrence system, border the state on the north and east for over 430 miles. These water facilities, the power furnished by the many streams and the wealth of natural resources combine to place the state among the leading commonwealths of the Union in commerce and industry, and its people have made it a political and educational leader as well.

**Size.** Covering 56,066 square miles, of which 810 square miles are water surface, Wisconsin ranks twenty-fifth in size among the states. It is only eighty-one square miles smaller than the state of Iowa, and is a little more than twice the size of New Brunswick, Canada.

**The People.** In the Federal census of 1910, Wisconsin, with 2,333,860 inhabitants, ranked thirteenth in population among the states. The average number of inhabitants per square mile was 42.2, which was 11.3 per square mile greater than the average for the United States as a whole. The population has steadily increased, and on January 1, 1917, it was estimated by the Census Bureau to be 2,513,758.

The native Indian tribes formerly inhabiting the territory of the present state were the Potawatomies, and the region was the meeting ground of the Algonquin and Dakota tribes. After the Black Hawk War in 1832 the remnants of the Indian tribes were sent to reservations in the Western states. A small number have remained on the Lac du Flambeau and the Lac Court D'Oreilles reservations in the northern woods, and these are occasionally seen in the towns, selling their beads, baskets and other trinkets.

About one-fourth of the population is of foreign birth; of this class, the Germans, Norwegians, Austrians, Russians and Swedes are most numerous. About forty-three per cent of the inhabitants live in cities or towns of 2,500 or more. The largest city in the state is Milwaukee, whose population in 1916 was estimated to be 436,535. Superior, Racine, Oshkosh, Madison, the capital, La Crosse and Sheboygan are cities of over 30,000 inhabitants, and Green Bay, Kenosha, Fond du Lac, Eau Claire and Appleton are next in importance. Each of these is described under its title in these volumes.

About one-half of the inhabitants are members of the Roman Catholic Church, more than one-fourth are Lutherans; and the Methodist, Congregational, Baptist, Presbyterian, German Evangelical and Episcopal denominations are well represented among the religious organizations of the state.

**Education.** Wisconsin has one of the best organized school systems in the Union. Liberal provision for public schools was made in the first constitution of the state, adopted in 1847, and over $13,000,000 is now expended each year on the public schools, which include all grades from the kindergarten through the university.

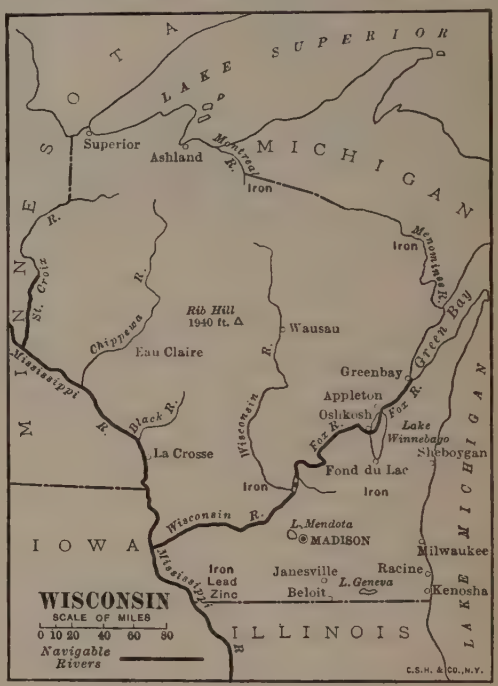
There are county schools of agriculture and schools of domestic economy in rural communities, Wisconsin being the first state in the Union to establish them. Vocational instruction is given in both graded schools and high schools. Rural schools and village high schools are encouraged by the state to maintain high standards by the granting of certain sums of money for their maintenance, and are visited by inspectors appointed by the state superintendent of public instruction. Junior colleges have been established, from which pupils are admitted to the junior class in the state university. The educational department coöperates in the welfare movement, and schools are used as recreation centers.

There is a compulsory-education law, requiring not only attendance at the graded schools, but that all children between fourteen and sixteen years of age living within two miles of a vocational or high school shall attend it or some equivalent school. When industrial or commercial schools are established, employed minors between the ages of sixteen and seventeen must attend for at least five hours a week for six months during the daytime, and employers are required to observe this law. These industrial and commercial schools are managed by local boards of industrial education. An accurate school census is taken each year, and the child-labor and compulsory-education laws are strictly enforced.

In 1910, out of a total school population of 782,240, there were 440,103 pupils enrolled in schools, and the illiteracy, most of which was among the foreign immigrants, was 3.2 per cent—an average less than that in thirty-seven of the states.

In the recent state survey of the University of Wisconsin at Madison, which is at the head of the school system and directly connected with the high schools throughout the state, that institution attracted country-wide admiration by its coöperation with the state commission. This aid given so willingly has established "the Wisconsin idea," and has been accepted as a symbol of the service a university may render to a state. As a result of the investigation, a state board of education, consisting of the governor, secretary of state and state superintendent of public instruction, has been created.

Wisconsin was the pioneer state in the establishment of county training schools for the preparation of teachers for the rural schools. These schools and the county agricultural schools are supported jointly by the state and




OUTLINE MAP OF WISCONSIN

Showing boundaries, navigable rivers, principal cities, mining centers and the highest point of land in the state.

the county. The state agricultural college, experimental station and farm are part of the state university, although partially supported and controlled by the United States Department of Agriculture.

There are state normal schools at Platteville, Whitewater, Oshkosh, River Falls, Milwaukee, Stevens Point, Superior and La Crosse.

Another important and commendable work of the educational department is the maintenance of school libraries which bring many of the best books within reach of every inhabitant of the state practically without cost. The traveling libraries are not promoted by the educational department, but by the state library commission. The library owned by the historical society at Madison is said to have more material than any other in the country upon

the history of the Mississippi Valley. Prominent private institutions of higher education include Beloit College at Beloit; Lawrence University at Appleton; Ripon College at Ripon; Milton College at Milton; and Milwaukee-Downer College, a school for women, at Milwaukee.

**Institutions of Charity and Correction.** The state supports hospitals for the insane at Mendota, Winnebago and Milwaukee; a school for the deaf at Delavan; an institution for the blind at Janesville; a home for the feeble-minded at Chippewa Falls; the state public school for dependent children at Sparta; a tuberculosis sanatorium at Wales; a soldiers' home at Waupaca; a reformatory at Green Bay; an industrial school for boys at Waukesha; a house of correction and an industrial school for girls at Milwaukee; a state prison and hospital for criminal insane at Waupun; and an industrial home for women in Fond du Lac County. The state board of control has charge of these institutions. There is a national soldiers' home at Milwaukee.

**The Land.** Wisconsin is a state of low, rolling hills and water-filled hollows, carved out by the ice sheet which long ago covered the northern part of our continent. Its rocky mounds, woody dales, swift streams, sparkling lakes and dense forests present many scenes of great beauty.

The state occupies the swell of land between the basins of Lake Michigan, Lake Superior and the Mississippi River. Its highest elevation follows a ridge of hills extending from north to south a little east of the middle, and meeting another line of hills stretching across the state from east to west, about thirty miles south of Lake Superior. There are no mountains; the loftiest elevation, Rib Hill, in Marathon County, rises 1,940 feet.

The gently undulating fields in the southern part of the state are exceedingly fertile and are adapted to the growing of cereals and tobacco. Much of the northern part is still covered with primeval pine forests, whose trails are followed by hunters of the deer and whose clear streams abound with fish. The game, wild nuts and berries of these woods, the plentiful supply of fish from their lakes and streams, and the wild rice from the bordering swamps furnish most of the food of the scattered inhabitants of this wild region.

Picturesque limestone bluffs border the Mississippi River, and alternating bluffs and sand beaches lie along the shores of Lake Michigan and Lake Superior. In the Dalles of the Wisconsin River, the glaciers have carved the hard rock into such grotesque forms and pillars as "Stand Rock," which resembles a great toadstool. The Apostle Islands in Lake Superior are another region noted for great beauty, and like the Dalles and the pine woods are popular as a summer resort.

**Rivers and Lakes.** Wisconsin has three drainage systems, one draining the eastern part of the state into Lake Michigan, another and shorter system emptying into Lake Superior, and the third and largest flowing into the Mississippi. The Wisconsin River, rising in the northeastern part of the state and flowing through the center, is the largest tributary of the Mississippi within the state. Others are the Saint Croix, which forms a part of the western boundary, the turbulent Chippewa and the Black rivers. All of these streams are fed by many tributaries, but none is navigable except the Wisconsin, which is connected by a short canal at Portage with the Fox River, thus affording a continuous water route from the Mississippi to Green Bay and Lake Michigan. Along this pathway the explorer, missionary and trader made their way into the heart of the state and of the continent.

The Fox, flowing through Lake Winnebago and emptying into Green Bay, is the largest of the rivers of the eastern system. The Menominee, forming part of the northeastern boundary, also flows into Green Bay, and the Milwaukee drains directly into Lake Michigan.

Among the short streams flowing into Lake Superior are the Saint Louis, the Montreal and the Brule rivers. The latter rises in the swamp from which the Saint Croix flows, and these two rivers, like the Wisconsin and Fox, form a waterway between the Great Lakes and the Mississippi. The Rock River, which rises in Lake Winnebago, flows south through the northwest corner of Illinois to the Mississippi.

There are more than 2,500 lakes in the state. The largest inland lake is Winnebago, which is connected with Green Bay by the Fox River and has on its shores the cities of Oshkosh and Fond du Lac. Other lakes noted for their beauty are Lake Mendota, on which Madison is situated, and Lake Geneva, on whose shores many magnificent summer homes have been built.

**Climate.** The climate varies considerably between the northern and southern extremities of the state, and there are sudden and extreme changes of temperature. The winters are gen-

erally cold. The summers are warm, except in the northern section. However, the temperature is less changeable than that of the inland states to the west, because of the modifying influence of the Great Lakes. The average summer temperature varies from about 70° in the south to 60° in the northern woods, and the mean winter temperature ranges from 25° in the south to 15° in the extreme north. The average rainfall is thirty inches. The pure, cool air, the hundreds of beautiful lakes and well-stocked trout streams and the health-giving pine forests have made Wisconsin one of the most famous summer resort regions of inland America. Thousands of tourists visit the state every year for health and recreation.

## *Sources of Wisconsin's Wealth*

**Agriculture.** The fertile fields of the south constitute the chief agricultural region in the state, and in spite of the fact that nearly all of the northern half of the state is timber land, Wisconsin is among the ten leading cereal states of the Union. About one-half of the total value of crops is the income from cereals, and about one-quarter of the total value, or nearly $40,000,000, is the income from the hay and forage crop.

By far the most important grain product is oats, Wisconsin usually ranking third or fourth among the states in the production of this crop. Corn is first in importance, and barley, potatoes, tobacco and rye are other large crops, the state being one of the leading barley and rye sections. The tobacco belt is in the central part of the southern section. The largest part of the crop is grown in Dane and Rock counties, and although isolated from the principal tobacco belt of the country, Wisconsin is the seventh tobacco state in the Union. Besides potatoes, various other vegetables are raised in large quantities; peas and beans are cultivated on a large scale in the vicinity of Green Bay and Manitowoc, and in their production Wisconsin is among the first five states. Quantities of sugar beets are also grown. Wheat is comparatively unimportant, but buckwheat is extensively raised.

Apples are the most abundant of the orchard fruits, though all of the hardy varieties are grown. Small fruits are cultivated with particular success, and strawberries, cranberries, raspberries and loganberries are important products. Wisconsin is one of the three states which produce cranberries in commercial quantities, the other two being New Jersey and Massachusetts.

*Dairy Products and Live Stock.* The fertile meadows and grass lands of the state furnish excellent pasturage for cattle, and dairying is one of the principal industries. Wisconsin is a leading dairy state; producing over 130,000,000 pounds of butter each year, it surpasses all other states in this product and is second only to New York in the output of cheese and milk.

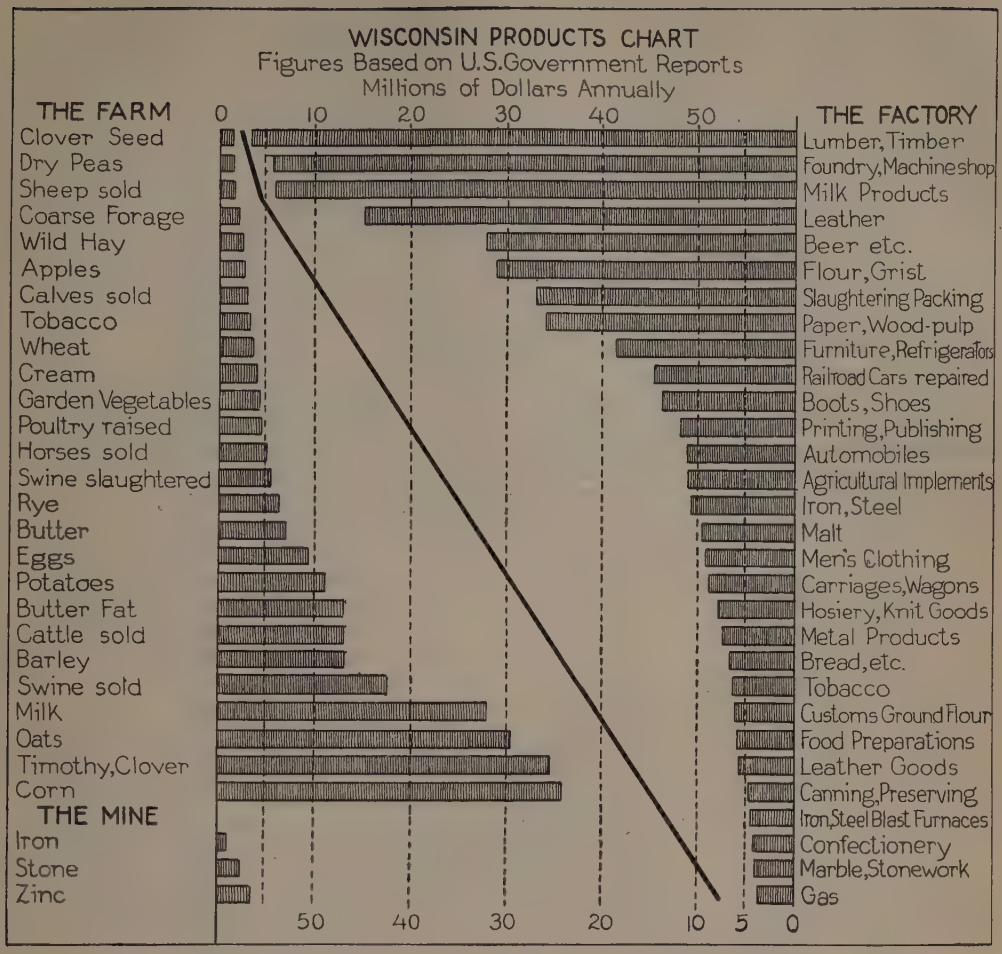
The live stock in the state in 1916 was valued at $266,650,000, the greater part of this amount being the value of milch cows and horses. The average annual wool clip exceeds 4,000,000 pounds.

**Forests.** The dense forests of the north yield great quantities of pine, and logging and lumber milling are the chief industries of that section. It was one of the earliest industries of Wisconsin, and every spring the swift streams carried thousands of logs down to the Mississippi. The state now ranks ninth among the United States in the production of timber.

State forests cover over 400,000 acres, and there is an annual appropriation of $35,000 for the support of the state forestry department. This department coöperates with the Federal government in forest-fire protection, and private lands are protected under the fire-warden system.

**Fisheries.** The fish caught each year in Lake Michigan, Lake Superior and the smaller lakes and streams provide an abundance of profit and sport, and the state has long been interested in increasing the food fish in its waters. The state fish commission superintends the work of the state hatcheries, which annually send out quantities of trout, pike, whitefish and bass to new homes in the waters of the inland lakes and streams.

**Minerals.** Without its great agricultural resources, Wisconsin would still be of importance in the Union because of its valuable mineral resources. The zinc deposits in the southwestern corner of the state furnish the most valuable mineral product; the value of the annual output exceeds $3,350,000 and places Wisconsin after Missouri, Montana and Colorado in zinc production. The quarrying of stone, including sandstone, limestone and granite, is second in importance, and Wisconsin is among the ten leading stone-producing states in the American Union.




The iron deposits, though much smaller, are similar to those of Michigan and Minnesota, the most valuable known. They occur in the Gogebic range, along the Menominee River and in the Baraboo district, in the south-central part of the state. The output of iron has decreased since 1910; in 1914 the total product was 591,595 long tons. Although Wisconsin has fourth place among the iron-producing states, its output bears no comparison with that of Michigan or Minnesota, and is only about one-third that of Alabama, which ranks third.

Clay products and lime (Wisconsin being the fourth state in the production of the latter), sand and gravel and lead are other important mineral products. Large quantities of mineral waters are also sold, and the springs at Waukesha have made that city a famous health resort. Small quantities of pyrite, copper and silver are found.

**Manufactures.** The water power furnished by Wisconsin's many streams, the transportation facilities, both by water and rail, and the large supply of raw materials furnished by the forests, farms and mines of the state have combined to place Wisconsin in the eighth rank among the manufacturing states of the Union. At the Thirteenth Census (1910) the state surpassed all others in the manufacture of butter, cheese and condensed milk, horse clothing, enameled and japanned wares and straw goods. It held second place in the manufacture of leather gloves and mittens, carriages and wagons, cement, saws and windmills, and third place in the output of steam railroad cars, glass, liquors and musical instruments.

The most important manufacturing industry in the state is the milling of lumber and the making of timber products. Marinette, on Green Bay, is the most important lumber cen-

ter of the Northwest; mills and factories are widely scattered throughout the state. Second in importance to lumber are foundry and machine-shop products. Foundries and shops are found in every large city throughout the southern and eastern section, and Milwaukee has one of the largest machine construction plants in the world. Racine is one of the leading cities in the United States in the manufacture of agricultural implements, and it is also the seat of large foundries and wagon, carriage and automobile factories.

The making of butter, cheese and condensed milk and the tanning and curing of leather are the next industries in importance. The Wisconsin and Rock River valley towns are noted for their dairies, and Milwaukee, Sheboygan and many other cities have large tanneries. Malt liquors constitute another of Wisconsin's chief products, Milwaukee being almost world-famous for its breweries. The milling of flour and grist centers at La Crosse, and it is an important industry throughout the southern and middle sections. Slaughtering and meat packing is another of the principal industries, and manufactories of paper, wood pulp, furniture, refrigerators and cars are found in almost every large city. Sheboygan is noted as the home of one of the largest pea canneries in the country. At Sturgeon Bay and Superior there are large shipyards and dry docks, where many of the lake freighters are built. The leading manufacturing cities are Milwaukee, Racine, Kenosha, Sheboygan, La Crosse, Appleton and Superior. The industrial commission enforces strict factory regulations and laws regarding child labor, workmen's compensation, employers' liability, the minimum wage, apprenticeship and industrial accidents. In progressive labor laws Wisconsin takes high rank.

**Transportation and Commerce.** Along its western boundary the state has 200 miles of navigable waterway in the greatest highway for river traffic in the United States. The northern part of the state has an outlet for trade through Lake Superior, and on Lake Michigan, forming the entire eastern border, there is a harbor at the mouth of every large stream. The canal between the Wisconsin and Fox rivers at Portage opens a water highway from the Mississippi to the Great Lakes, and another at Sturgeon Bay connects Green Bay and Lake Michigan.

Besides the water transportation, there are over 7,500 miles of railroad in the state. The most important lines are the Chicago, Milwaukee & Saint Paul; the Chicago & North Western; the Minneapolis, Saint Paul & Sault Sainte Marie; the Wisconsin Central; the Green Bay & Western; the Chicago, Burlington & Quincy; and the Northern Pacific.

Milwaukee is the chief commercial port on Lake Michigan, and from this harbor and those of Racine, Sheboygan, Manitowoc, Sturgeon Bay and Marinette millions of tons of freight, chiefly lumber and timber products, iron, dairy products, flour and vegetables are sent to eastern markets. Superior is the chief Wisconsin port on Lake Superior, and has one of the finest natural harbors in the country. It consists of two bays protected by sand bars and gives forty-nine miles of protected coast line. Including the commerce of Duluth, just across the border in Minnesota, more freight is handled in the Duluth-Superior harbor than in any other inland port in the United States, and it claims to rank third among the commercial ports of America in the amount of water traffic. Ashland is another large port on Lake Superior for the shipment of iron and lumber.

## *Government and History*

**Government.** The first constitution, adopted in 1847, still remains in force. The *executive* department consists of the governor, lieutenant-governor, secretary of state, state treasurer, attorney-general and insurance commissioner, all elected for two years, and a state superintendent of public instruction, elected for four years.

The *legislative* body is composed of the senate and house of representatives, and it meets biennially. There are thirty-three senators, elected for four years, and 100 representatives, elected for two years.

The *judiciary* consists of a supreme court of seven judges and a circuit court in each of the seventeen judicial districts. The supreme court judges are elected for ten years by the people at large, and the circuit judges are elected by the voters in each district. A probate judge and justices of the peace are elected by the voters in each county. Local administration is by counties.

**Settlement.** No state in the Union is richer in historic remains of its Indian occupants than Wisconsin. The region was probably first visited by a white man in 1634, when Jean Nicolet,

# WISCONSIN

MINNESOTA

LAKE SUPERIOR

Superior

Washburn

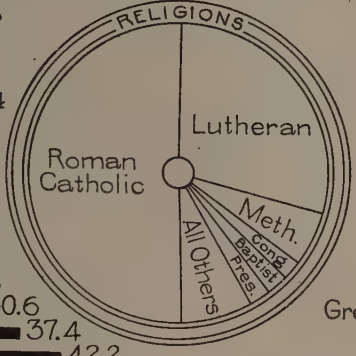
Ashland

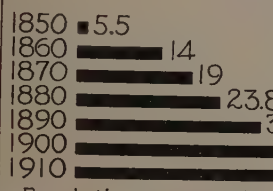
The Lake Cities of the State

WISCONSIN

MICHIGAN

Congressional Districts




Population per sq. mi. by decades

Marinette

Oconto

Green Bay

Sturgeon Bay

Kewaunee

Two Rivers

Manitowoc

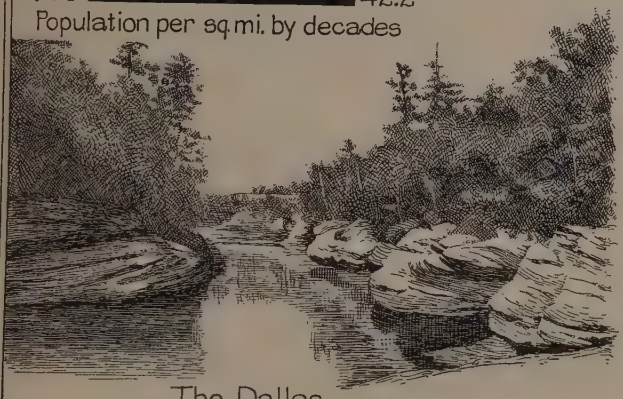
Sheboygan

LAKE MICHIGAN

Milwaukee

Racine

Kenosha



The Dalles

Main Building of the State University

a French explorer sent by Champlain, entered Green Bay and followed the Fox River to Lake Winnebago. Four years later two French traders, Radisson and Groseilliers, followed the Fox and portaged across to the Wisconsin River, which they descended nearly to the Mississippi. This route was later followed by the missionaries, Allouez, Joliet and Marquette. In 1669 a mission was established on the Fox River, which later grew into De Pere, the first permanent settlement. Rude forts were built on Lake Pepin by Nicolas Perrot, who was the discoverer of the lead mines in Southwestern Wisconsin. In 1763, by the Treaty of Paris, the English came into possession of the region, and they permanently established the settlements begun by the French at Green Bay, Prairie du Chien, Milwaukee and Portage. After the Revolution, Wisconsin was a part of the Northwest Territory of the United States, but in reality it remained under British control until after the War of 1812.

**Territorial Government.** The opening of the lead mines in 1822 brought an influx of settlers, and after the Indians were overcome in the Black Hawk War many immigrants came from the farms in the Ohio Valley and the Eastern states. Wisconsin was successively a part of the territories of Indiana, Illinois and Michigan. In 1836 it was organized as a separate territory, including parts of Minnesota, Iowa and the Dakotas. Two years later that part of the territory west of the Mississippi was included in the territory of Iowa.

**Statehood.** The steady immigration of foreigners and of settlers from the Eastern states rapidly increased the population. In 1847 a constitution was adopted, and the following year Wisconsin was admitted as a state. There has been rapid advance to the front ranks in industrial and social progress. In 1913 the attention of the nation was directed toward a progressive law in Wisconsin which provided for a physical examination of all male applicants for licenses to marry. It was called the "eugenic law." In a county court the law was held to be invalid, but the state supreme court reversed the lower, declaring the statute provided a proper exercise of power. Because of this law there were 1,400 fewer marriages in the state the following year than in the year preceding.

In 1914 there was an attempt to secure suffrage for women, but the legislature defeated the measure. A law has been passed providing for aid to dependent children of worthy mothers; the state pays one-third of the sum necessary and the county two-thirds.

**Other Items of Interest.** One of Wisconsin's most interesting relics of the Mound Builders is the great elephant mound in Grant County. It is sixty feet high, 135 feet long, and has a trunk thirty-one feet in length.

Such names as Eau Claire, Fond du Lac, Prairie du Chien and La Crosse show very plainly the influence of the early French explorers and settlers.

Wisconsin was once one of the chief hop-growing states of the Union, but to-day its production of hops is almost negligible.

On the Mississippi River there is shown a high bluff from which, tradition declares, an Indian girl leaped to death rather than marry a man she did not love. The bluff bears the name of Maiden Rock.

Wisconsin has, at Madison, one of the most beautiful capitol buildings in the Union, completed in 1916. The interior is ornamented with specimens of Wisconsin granite which show remarkable diversity of color and structure.

The action of the great glaciers gave Wisconsin many waterfalls and rapids, which are of the utmost value in furnishing water power. It is thus an interesting fact that industrial establishments are most numerous in the glaciated area. The driftless area, as the region never visited by the glaciers is called, is in the southwestern part of the state.

The glaciers were also responsible for the hollowing out of most of the lake beds. Of the 2,500 lakes in the state, more than four-fifths, it is estimated, are due to glacial action.

The Indians depend for no small part of their food on the wild rice which grows in such profusion in the marshy regions and on the low shores of the lakes.

A factory at Sheboygan is said to be the largest in the world devoted exclusively to the manufacture of chairs. E.B.P.

Consult Thwaites's *Wisconsin in Three Centuries;* McCarthy's *Wisconsin Idea;* Howe's *Wisconsin: An Experiment in Democracy.*

**Related Subjects.** For further information as to Wisconsin, its geography and its industries, the reader may consult the following articles in these volumes:

CITIES

Appleton
Ashland
Beloit
Eau Claire
Fond du Lac
Green Bay
Janesville
Kenosha
La Crosse
Madison
Manitowoc
Marinette
Milwaukee
Oshkosh

# *RESEARCH QUESTIONS ON WISCONSIN*

**(An Outline suitable for Wisconsin will be found with the article "State.")**

How does Wisconsin rank among the states of the Mississippi Basin as to area? As to population?

How many states in the Union are larger? How many of these larger states have a greater population? (See table with article UNITED STATES.)

How can you tell whether the state is named for its chief river or the river is named for the state?

What is the state's popular name? What is the state flower? What other states have chosen the same floral emblem? (See FLOWERS, subtitle *State Flowers.*)

How many states were formed from the Northwest Territory? How many of these states were formed before Wisconsin?

What is there in the state's location and boundaries which has been of especial value in its commercial development?

What state of the Union most closely resembles Wisconsin in area? How do the two compare as to population?

How does Wisconsin compare as to density of population with the states upon which it borders? With the United States as a whole?

On what uncultivated product of the soil do the Indian inhabitants in part subsist? Where do most of the Indians live?

How many cities in the United States are larger than Wisconsin's greatest city? (See list with article CITY.)

What is understood by "the Wisconsin idea" in education?

In what important educational movement was this state a pioneer?

How much higher or lower is the loftiest point in Wisconsin than the loftiest point in each of the bordering states?

What and where is "Stand Rock?" What is "Maiden Rock," and why so named?

What does the name "Dalles" mean? In what other states are similar formations to be found?

What is the only navigable river within the state of Wisconsin? What historic interest attaches to this river?

If you knew nothing of the early history of this state, how could you guess that the French had visited it at some time?

How many lakes has the state? How does it compare in this respect with Florida? By what agency were most of Wisconsin's lakes formed?

How many states surpass Wisconsin in total value of dairy products? In the production of milk? Of cheese? Of butter?

Upon what natural resource do the foremost manufacturing industries of Wisconsin depend?

How many states outrank Wisconsin in the production of iron?

Where is the largest chair factory in the world, so far as is known?

What is the railroad mileage to each hundred square miles of area? How does the state compare in this respect with each of the states upon which it borders?

How does the state aid in the upkeep of roads? In the conservation of forests? In the conservation of fishery resources?

How do Superior, Wisconsin, and its "twin city" in a neighboring state rank in amount of freight handled among inland ports of the United States? Among all ports of America?

| | |
|---|---|
| Racine | Waukesha |
| Sheboygan | Wausau |
| Superior | |

LEADING PRODUCTS AND INDUSTRIES

| | |
|---|---|
| Barley | Milk |
| Butter | Oats |
| Cheese | Rye |
| Dairying | Tobacco |
| Hay | Zinc |
| Lumber | |

PHYSICAL FEATURES

| | |
|---|---|
| Dalles | Rock River |
| Great Lakes | Wisconsin River |
| Mississippi River | |

UNCLASSIFIED

| | |
|---|---|
| Glacial Period | Northwest Territory |

**WISCONSIN,** UNIVERSITY OF. The University of Wisconsin comprises three colleges, five schools and two divisions—the college of letters and science, the college of engineering, the college of agriculture, the law school, the medical school, the school of music, the graduate school, the library school, the division of physical education and the university extension division. Within the colleges are various courses, the scope and character of which are indicated by their titles—the course in chemistry, the course in commerce, the course in journalism, the course in pharmacy, the course for the training of teachers, the course in home economics, and so on. All departments of the university are well equipped with buildings, laboratories and apparatus. During 1915-1916 there were 6,765 students in attendance.

The service of the university is not confined to the students who are in residence at Madison. Through the extension work many thousands, a large proportion of them adults, are reached in every community in the state. It is estimated that during the year 1915-1916 the university reached, through its extension division, not fewer than 175,000 people. The extension work is carried on through correspondence study courses, through lectures given mainly by members of the university faculty, through community institutes, through the municipal reference bureau, and in other ways. The study undertaken by students in their own communities is intended to be of as high grade and as thorough-going in character as that done in the lecture halls or laboratories of the university. There are in reality branches of the university established in various communities in the state, and from these lecturers and teachers come into direct contact with students who are studying in their homes.

It is estimated that the college of agriculture, through its extension service, reached about 225,000 people during the year 1915-1916. In this manner the rural life and agriculture of Wisconsin are profoundly influenced, and the results are apparent in the material prosperity of the farmers of the state. Since about 1900 the dairy products have increased from $21,000,000 to $93,000,000; this vast increase has been made possible mainly through the work of the university. Also the development of high-bred seed adapted to different sections of the state—barley, oats, corn, rye, wheat, tobacco—has resulted in increasing the wealth of the state by more than a score of millions of dollars per year. The investigation of plant diseases, such as the smut of oats, blight on potatoes, diseases of peas, etc., has reduced the agricultural losses by many millions of dollars each year.

All the colleges, schools and divisions of the university are active in promoting human welfare in every section of the state. The policy of the university is to make its work bear very directly upon the actual problems of life. The faculty is committed to the policy of making its work felt throughout the state and not merely on the campus.

The state of Wisconsin appreciates the services thus rendered. The income of the university is a little over $3,000,000 a year. The state provides liberally for research in every field of knowledge and human activity. The university is distinguished alike on account of its charming location on Lake Mendota, in the beautiful city of Madison, and also because of its contributions to the sum of human knowledge. While it has attracted attention throughout the world because of its achievements in applying science to everyday human affairs, it has also commanded the highest respect because of its numerous and valuable contributions to letters and to pure science. The university was founded in 1838. M.V.O'S.

Consult Slosson's *Great American Universities.*

**WISCONSIN RIVER,** the most important river of Wisconsin. It rises near the Michigan-Wisconsin boundary, flows southwest to Portage, then turns westward, entering the Mississippi near Prairie du Chien. Its entire length is about 430 miles, and it is navigable to Portage, where it is connected by a canal with the Fox River. In flood time the two rivers unite. Merrill, Portage, Wausau, Grand Rapids, Baraboo and Stevens Point, the latter the center of a rich lumber district and the home of one of the state normal schools, are the principal cities on its bank.

**WISTARIA,** *wis ta'ri a,* a beautiful flowering vine of the pea family, named after Caspar Wistar, an American physician. It is one of the most magnificent climbers of the flower garden, with graceful clusters of bluish-lavender blooms, resembling pea blossoms, drooping from a screen of foliage. The Chinese species, first introduced into England in 1816, often has flower clusters three or four feet in length, and there is said to have been one plant of this species whose branches reached a hundred feet on each side of the central woody stalk; those of another covered nearly a thousand square feet of wall space. Wistarias grow in nearly all kinds of soil, and are propagated by seeds and by cuttings.

WISTARIA

**WIS'TER,** Owen (1860- ), an American novelist, born at Philadelphia. He was educated in literature and law at Harvard University, was admitted to the bar in Philadelphia, but practically abandoned the profession in 1891 to give his time to writing. He began by contributing humorous verse and fiction to magazines, but soon became interested in life in what was then the unsettled West of the United States—Idaho, Nevada and neighboring territory—and wrote stories dealing with adventures on the prairies and about the gold and silver mines.

His first book, *The Modern Swiss Family Robinson,* appeared in 1883, but his more characteristic stories of Western pioneer life began in 1896 with *Red Men and White, Lin McLean, The Jimmy John Boss* and *The Virginian.* This last mentioned book portrays one of the most powerful pictures of frontier struggle to be found in American literature, and it was dramatized successfully. Wister has done some valuable work in biography in his *U. S. Grant, Oliver Wendell Holmes* and *Benjamin Franklin,* while his collaboration with Grinnell and Whitney in writing *The Musk-Ox, Bison, Sheep and Goat Family* in the American Sportsman's Library was a real contribution to the study of American animal life. Wister has not confined his fiction to Western themes, as his *Lady Baltimore,* dealing with colonial days, and his *Philosophy 4,* describing Harvard student life, show; but undoubtedly his strongest work has been that portraying life in the frontier settlements. Later books from his pen are *The Seven Ages of Washington, Members of the Family* and *The Pentecost of Calamity.*

**WITCHCRAFT,** *wich' kraft.* The term refers to the general belief in and practice of bewitchment by casting a spell, but more commonly to the special varieties of the belief and the practices connected with it that arose under Christian influence in Western Europe. The belief in witchcraft is a generic reaction of the primitive mind, which is ready to detect in the incidents and accidents of life the workings of spirits or demons and to believe in the possession of mystic powers by favored individuals. The use of the power to inflict injury is *witchcraft.* It may emanate directly from the individual, as in the "evil eye;" but usually it requires a proper ceremony or incantation to fix the spell. The agency that makes the spell work may be (and in developed forms of witchcraft is generally) regarded as a spirit, or may be vaguely conceived as part of the operations of nature.

The object through which the bewitchment takes place is, if possible, a part of the person of the victim—the paring of his finger nails, a lock of his hair, a bit of his clothing, or some article which he has touched or used, but it may be an object chosen to represent the victim. By burning or piercing with thorns, or by reciting a potent formula, using the victim's name, the injury that is wished and acted will be transferred to the bewitched person. Hence, the widespread practice of destroying finger nails, cuttings of hair, even scraps of food, so as to prevent their being used as a means of bewitchment; hence also the concealment of the true name and the use of another in ordinary intercourse. Bewitchment may extend to cattle and crops; the blight may be cast upon all one's possessions and ventures. The term is naturally extended to a similar power, however exercised, such as the power to raise storms, to remove the crops, to transform men into animals, to work miracles.

In the special sense witchcraft implies the coöperation or command of a spirit or demon. The bewitched person becomes possessed, and the driving out of the demon is the act of exorcism. The existence of laws making witchcraft a crime shows how continuously the belief

flourished from Roman days, and earlier, to recent times. These laws prohibit the injury or removal of crops, the finding of treasure, the pulling down of crosses, the making of images, the digging up of corpses to be used in the practice. If children became suddenly ill, if a horse became lame, if a man lost his way in the woods, if the crops failed, if the butter would not churn, if a cart stuck in the mud, the charge of witchcraft might lead to the fixing of suspicion upon some person peculiar in habit or appearance, in satisfaction of a private grudge.

Whether it was in the light of Biblical example, or, as an older writer suggests, through the greater inherent wickedness of women, women were more generally accused of the practice, though men and even children were not exempt. In the developed form of the belief, the witch derived her power by compact with the Devil, Satan conferring the power and receiving the soul of the witch as his compensation. The witches were supposed to assemble, riding through the air to the place of meeting, and vie with one another in committing foul deeds and profaning Christian practices. They were supposed to have the power to transform themselves into animals to escape detection, to be accompanied by familiar spirits whom they called by name and who did their bidding. They were accused of having children by these demons, thus breeding monsters.

The historical persecutions for witchcraft owed their incentive to the zeal of the guardians of the Church. The most notable document was the bull of Innocent VIII (1484), which is said to have destroyed more innocent lives than any other similar pronouncement. Historians estimate that 100,000 persons perished under the charge of witchcraft between the middle of the fifteenth and the middle of the sixteenth century. A typical charge is the investigation of James I as to why tempests beset his bride on her voyage from Denmark. Under torture a Dr. Fian confessed that several hundred witches took to sea in a sieve from Leith and caused the storm. The use of torture was unlimited, and the confessions thus extorted added to the belief in the reality of the crime. In the sixteenth, seventeenth and eighteenth centuries, under the leadership of churchmen, outbreaks of accusation of witchcraft arose from time to time in Germany, England, France, Spain and Italy; while the last occurred in Salem, Mass. (see below), and is the great blot on Puritanism.

The details of the witchcraft persecution carry out the system of demonology which supports it. Some of the tests for witches are suggestive. One of these was the pricking test. Spots were found where pins could be inserted into the skin without causing pain; these were explained as spots at which the devil had touched the witch. Another was the water test; if, when thrown into the water, the accused floated, she was proved a witch; if she sank, she was innocent. The laws of New England (1655) define witchcraft as "fellowship by covenant with a familiar spirit, to be punished with death." Consultants with spirits were not to be tolerated. The spirits played a large part in the evidence. In one of the English trials it was recited that some children fell into fits and vomited crooked pins; that they could not pronounce holy names, as "Lord," "Jesus" or "Christ," but would readily speak the names "Satan" or "Devil." Clearly they were possessed. In other cases the familiar spirits would answer through the mouth of the possessed. In still others it was the Devil himself or some of his demons that appeared; or the accusation took the form that the witch was attended by the spirit of a deceased human being, and was directed by such spirit. The accused often confessed, at times under torture or fear of torture, admitting their compact with the Devil, their attendance at the witches' Sabbath, their power to raise storms, blight the crops, cause disease, transform themselves into beasts and to produce apparitions.

Certain of these details are interesting, in that they indicate the psychology of the process. The insensitive spots often occur in cases of hysteria; false confessions of children under strong suggestion have been frequently witnessed; the trance states and hallucinations under strong emotions, also the speaking as with the voice of another contributed to the evidence of the reality of witchcraft, as they did later to the reality of spiritualistic phenomena. But historically it was not the insight into the nature of the phenomena thus evoked, but rather the growing moral aversion to such cruel practices and the waning of superstitious belief that put an end to the persecution and recognized the delusions on which it rested. The number of distinguished and well-meaning persons who subscribed to the belief in witchcraft and countenanced the measures taken for its extermination testifies to the dangers inherent in such delusions, when joined with a strong motive (such as religious zeal), and

their power to oppose the dictates of reason and humanity.

The development of witchcraft proceeded upon an accredited belief in the existence of spirits of evil. In this respect it continued and systematized the primitive notion of an unseen world of demons into a doctrine of demonology. In primitive procedure even so remote an event as an eclipse was interpreted as the act of a demon, and drums were beaten to drive the monster away. The "possession" theory of disease grows directly out of this view; primitive exorcism draws disease out of the victim's body, possibly by a magic stone (meteor), possibly by incantations. Certain forms of illness, such as epilepsy, with its strange contortions, failure of consciousness and prompt recovery, strongly bear out this explanation. Under the incentive of an advance theology the kingdom of good and angels is set up against the kingdom of evil and demons, of light against darkness, of heaven against hell. The work of the Devil is detected in crime and temptation and sin. There arise such realistic imaginings as vampires, or witch-souls that suck the blood of living victims.

Even so late as 1788 an epileptic lad had seven devils exorcised by seven clergymen in the Temple Church, London. Demons were supposed to insinuate themselves into the bodies of patients and attack lunatics at full moon. Demonology included the belief in were-wolves (possibly to explain nocturnal depredations) and the power of witches to convert themselves into such forms. In later beliefs the witch turned into more innocent creatures, such as hares. On no more convincing evidence than that of a child who saw a hag at her door and the next moment saw a hare run by while the woman had disappeared, was she accused of turning herself into a hare by witchcraft.

While the extravagant fancies of demonology represent the most fantastic issues of this belief, the whole conception formed an essential part of the world of ideas which made the charges of witchcraft possible; without it the religious persecutions would not have occurred. Witchcraft represents one phase of the religious development of a mental attitude that has played a large part in civilization.

**The Salem Witchcraft.** Reference has been made above to the presence of witchcraft in Salem, Mass. While that city bears the greater burden in connection with this delusion in the United States there were persecutions, also, in other parts of Massachusetts and in Connecticut and Virginia. In Salem the persecutions were largely due to the misguided zeal of Cotton Mather, famed as a colonial preacher and orator. Through a work entitled *Memorable Providences Relating to Witchcraft and Possessions* and his pulpit utterances he stirred the people to frenzy in 1692—a time when belief in witchcraft was abating in Europe. Nineteen people were put to death after conviction as witches, and over 150 suspected persons were in prison when the public conscience turned to saner views a few months later. No further persecutions shamed the American colonies.

**The End in Europe.** In England the last trial for witchcraft occurred in 1722; the suspect, a woman, was not convicted. In the same year the last execution occurred in Scotland, and was followed in 1735 by laws repealing the statutes relating to witchcraft. On the Continent many of the peasantry yet recognize the power of witches to influence their lives. J.J.

Consult Gummere's *Witchcraft and Quakerism;* Notestein's *History of English Witchcraft from 1558 to 1718.*

**Relating to Various Beliefs.** The articles on the following topics, while all do not bear on witchcraft, may be of interest in this connection:

| | |
|---|---|
| Alchemy | Occult |
| Astrology | Palmistry |
| Clairvoyance | Phrenology |
| Conjuring | Physiognomy |
| Demonology | Psychical Research |
| Divination | Psycho-Analysis |
| Faith Cure | Spiritualism |
| Hypnotism | Subconscious |
| Magic | Suggestion |
| Medium | Superstition |
| Mesmerism | Telepathy |
| Mind Reading | Theosophy |
| Necromancy | Trance |

**WITCH-HAZEL,** a tall shrub of the woodlands of Eastern United States and Canada, easily distinguished by its jointed and curving branches. Owing to their tendency to twist and point in all directions, the forked twigs were used by treasure seekers as divining rods, and because of the supernatural power the plant was thus supposed to possess it was called the *witch-hazel.*

Another peculiarity of the shrub is its unusual season of bloom. In October or November, after the falling of the leaves, which the early frosts have turned a clear yellow, the straggling branches are reclothed with the feathery, golden clusters of the long-delayed flowers. The fruits do not ripen until the following year, and then the bulletlike seeds are

expelled from an elastic opening in the small, woody capsules.

In various localities the shrub is known as the *winterbloom* and the *spotted alder,* or, owing to the pungent taste of the bark, as the *tobacco wood.*

**In Medicine.** The bush is important as the source of the healing and tonic lotion known as witch-hazel, or *hamamelis,* which is obtained by distilling the leaves in alcohol. It is used both as an external and an internal remedy.

WITCH-HAZEL
Branch, flowers, leaves and seed.

**WITENAGEMOT,** *wit'enahge moht',* the supreme council of England in the Anglo-Saxon period, composed of the king, bishops, ealdormen and thanes. It enacted secular and sacred laws, assented to land grants, voted on war or peace, was a court of last resort and approved the appointment of ealdormen or bishops. The members also had the power of electing a king when the succession was uncertain, and of dethroning a negligent sovereign. As the power of the ruler grew strong that of the assembly declined, and vice versa. The Witenagemot was disbanded after the Norman Conquest.

**WITH'ERSPOON,** JOHN (1723-1794), an American clergyman, college president and one of the signers of the Declaration of Independence. He was born at Gifford, in Scotland, studied at the University of Edinburgh, and in 1743 was licensed to preach, holding pastorates in various cities until 1768, when he went to America to become president of the College of New Jersey (now Princeton University). As teacher and organizer he displayed great ability, advancing materially all departments of the institution. In 1774 he was a member of the provincial congress, in 1776 of the New Jersey constitutional convention, and from 1776 to 1783, except for a short interval, of the Continental Congress. He was active in urging the adoption of the Declaration of Independence, and was the only clergyman who signed that document. He wrote *Ecclesiastical Characteristics, Essay on Justification* and *Authority of the British Parliament,* besides many sermons.

**WIT'NESS,** one who gives testimony before a court or judge and is examined under oath or affirmation. A person who has affixed his name to an instrument, such as a will or a deed, executed by another, is also known as a witness. In law, the summons by which a witness is ordered to appear in court is called a *subpoena;* this is used for the purpose of compelling him to attend and give evidence. If he fails to appear he is liable to punishment for contempt of court. A trial court may ask a witness such questions as it deems necessary for its own information and that of the jury, and witnesses are required to testify from their own recollection and knowledge. Matters relating to the competency of witnesses are regulated by the rules of evidence; those in the class of incompetents include persons unable to understand the nature of a binding oath, idiots, insane and intoxicated persons. Persons who have been convicted of infamous crimes are often called as witnesses, but the evidence they give is usually considered in connection with their past records, which frequently dictate their motives.

**WITTE,** *vit'e,* SERGEI YULIEVITCH (1849-1915), one of the most distinguished of modern Russian statesmen. He was born at Tiflis, studied at the University of Odessa, and after spending some time in journalism entered the government railway service. During the Russo-Turkish War of 1877-1878 he proved himself so capable in the movement of troops that at its close he was made general traffic manager of the Southwestern Railway of Russia. As a member of the Imperial railway commission some years later he displayed marked ability, and in 1888 was made head of the railway department in the finance Ministry. Becoming Finance Minister in 1893, he did much to develop railroads throughout the Empire, promoted industries, brought about the resumption of specie payment, and with a view to lessening the evils of drunkenness organized a government monopoly for the sale of vodka, the national drink of Russia. These regulations remained in force until prohibition was forced upon the Empire in 1914. His foreign policy

had as its central aim the freeing of Russia from economic dependence on other nations.

So great was the opposition his energetic measure wakened that in 1903 he was removed from the finance Ministry and placed at the head of a committee of Ministers, a merely honorable position. When, however, the Russian demands for constitutional reform became too strong to be denied, it was this committee which worked out a new administrative problem.

In 1905 Witte was the chief Russian plenipotentiary in the peace negotiations with Japan at Portsmouth, N. H., at the close of the Russo-Japanese War, and on his return he became president of the first constitutional Ministry. Differences with the emperor and lack of popular support led to his resignation from office in May, 1906.

**WITTENBERG,** *vit'en berK,* a town in the province of Saxony, in Prussia, famed in history as the place in which Luther began the Reformation. Its most interesting features are the old Schlosskirche, on the doors of which were nailed the famous ninety-five theses, and the houses of Luther and Melanchthon, which have been carefully preserved. Wittenberg lies on the Elbe River, and is fifty-five miles southwest of Berlin. It is a manufacturing center of considerable importance, producing woolen and linen goods, hosiery, machinery, pottery, electrical goods and other commodities. The market place contains statues of Luther and Melanchthon. The University of Wittenberg, founded by Frederick the Wise in 1502, was incorporated with the University of Halle in 1817 (see subhead, under HALLE). Population in 1910, 22,419.

**WOAD,** *wohd,* a leafy, many-branched herb bearing yellow flowers, found in Great Britain and the Mediterranean countries. The species called *dyer's woad* was formerly cultivated for a blue dye obtained from its leaves, with which the ancient Picts are believed to have stained their bodies. The leaves were made into a paste, fermented for about two weeks and worked into balls, which were dried in the sun and allowed to ferment a second time. In the present age indigo is largely used in place of woad dye, although a finer color is obtained by mixing the two.

**WOBURN,** *woo'burn,* MASS., a city in Middlesex County, is an important leather manufacturing center and an attractive residence city, ten miles northwest of Boston. It is served by the Boston & Maine Railroad and by interurban lines. In 1910 the population was 15,308; in 1916, 15,969 (Federal estimate). The public library, which contains a fine art collection, is the most prominent public building. The output of factory products, including leather, the leading article, and chemicals and glue, has an approximate annual value of $6,000,000. Settled as Charlestown Village in 1640, Woburn was incorporated as a town in 1642 and became a city in 1888.

**WO'DEN.** See ODIN.

**WOLF,** a rapacious, flesh-eating animal belonging to the dog family. It resembles a gaunt, long-legged dog with a wide head, long nose and pointed muzzle. Its thick tail is drooping, but its ears are always erect. Its fur varies in color and thickness according to the climate in which it lives, the longer, thicker and lighter coats belonging to the northern species.

HEAD OF THE WOLF

The most common of the species, formerly abundant in America, is the *gray* wolf, found in wild regions throughout the Middle States. The large *white* wolf is common in the Arctic regions, and formerly inhabited the northern plains of the United States; the *black* wolf is found in the South, and the cunning *red* wolf lives in the Southwestern plains. The *prairie* wolf of the West, where it is erroneously called the *coyote,* has the pointed muzzle of a fox, and like the red fox it is a burrowing animal and digs its den in the ground. Because of its short howl, which resembles the bark of a dog, it is also known as the *barking* wolf. The *coyote,* also an inhabitant of the arid sagebrush country, is scarcely larger than a fox. It is a cowardly, slinking creature, with a thick, wolfish head, small, sharp ears and a long, slender muzzle, and is known far off in the blackness of the night by its dismal howl. Except in the British Isles and Northern Germany, the common *grayish* wolf, resembling the gray wolf of America, is found throughout Europe, and in Russia and Scandinavia it causes much destruction of weaker animal life.

In the spring and summer the wolf lives alone or in pairs, making a den in a hol-

low tree or cleft in the rocks, and preying upon small mammals and fowls. In winter the creatures unite in packs, ranging the country and attacking large game. When pressed by hunger they attack travelers, and have been known to enter villages and carry off children. In the plains of Siberia ferocious packs trail sleds for miles, often overtaking the terrified and exhausted horses and attacking the travelers.

The wolf can be tamed, and has occasionally been trained to hunt like a dog. It is more sly and fierce in its attack than is the dog, but lacks the latter's courage and loyalty. In the United States and Canada wolves, as well as many species of foxes, are raised in captivity for their pelts. C.H.H.

On page 1828 is an illustration of numerous members of the dog family.

**WOLFE,** JAMES (1727-1759), a British general whose successful campaign at Quebec gave Canada to the British Empire. He was born at Westerham, in the county of Kent, England, entered the army at the age of fourteen and early saw service in Scotland and Flanders. Sailing to America, he served as brigadier-general in the Louisburg expedition under Amherst and Boscawen, leading the foremost troops in the brunt of the fight. Returning to England on account of ill health, within a short time he was requested by William Pitt to take up his command in America again. Raised to the rank of major-general, Wolfe undertook the attack on Quebec. With health shattered by internal disease, after disheartening failures his efforts were crowned with success on the Plains of Abraham. Dropping down the river in boats with muffled oars his troops landed and scaled the precipitous banks and were drawn up in battle array before the French in Quebec were aware of their approach.

GENERAL WOLFE

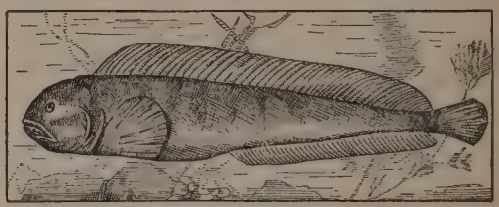
It is said that Wolfe beguiled the night approach down the river by reciting to his officers Gray's *Elegy Written in a Country Churchyard.* When he finished there was silence till Wolfe spoke solemnly, saying, "Gentlemen, I would rather have written that poem than take Quebec to-morrow." Twice wounded, he fought till he was mortally wounded by a third bullet, which passed through his lungs. As he lay dying, some one near him called, "See! They run!" "Who run?" gasped Wolfe. "The enemy," was the answer. Giving one final order, Wolfe said, "Now God be praised, I die in peace." The battle ground bears a monument, on one side the simple epitaph, "Here died Wolfe, victorious on the 13th of September, 1759." His gallant opponent, James Montcalm, survived him only a few hours, and the same monument is a tribute to the worthy Frenchman (see page 4897).

Consult Salmon's *General Wolfe;* Willson's *The Life and Letters of James Wolfe.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

Canada (page 1121)
French and Indian Wars (page 2330)
Montcalm de Saint-Veran
Quebec, Battle of

**WOLF FISH,** a savage fish of the North Atlantic, so named from its ferocious habits and aspect. It is grayish in color, and attains a length of about five feet. The mouth is armed with strong, interlocking front teeth, adapted



THE WOLF FISH

for crushing the mollusks and other crustacea upon which it feeds. Its flesh tastes much like that of the cod, and in Iceland it is largely used as food, while its strong, durable skin is made into shagreen, or pressed leather, employed in making pouches, in bookbinding, and for other purposes. The wolf fish attacks its captors savagely, and unless stunned by a blow is capable of inflicting damage with its strong teeth.

**WOLSELEY,** a village in the province of Saskatchewan, near which the Canadian Pacific Railway has a nursery containing three-quarters of a million trees. The town is on the main line of that railroad, between Brandon and Regina, and is the terminus of a branch line to Reston. Population, 1911, 961; in 1917 (estimated) 1,050.

**WOLSELEY,** *woolz'li,* GARNET JOSEPH, Viscount (1833-1913), a British field marshal, born in County Dublin, Ireland. Entering the army

in 1852, he first saw service in the second Burmese War, and was severely wounded and sent home as unfit to take further part in the campaign. In the Crimean War he performed distinguished service and received the French Legion of Honor and the war medal, as well as a promotion to the rank of major. After serving in India, where in the Sepoy Rebellion he took part in the capture of Lucknow, he was placed in command of the British troops in the Chinese War of 1860, being present at the most important engagements.

Afterwards sent to Canada, he successfully crushed the first rebellion of Louis Riel (1870) at Fort Garry, now the city of Winnipeg, but then a mere outpost in the wilderness. Wolseley received credit for his admirable arrangement of transport and supplies on this expedition, and was made K. C. M. G. and C. B. (see ABBREVIATIONS).

Wolseley's next and most important campaign was in 1873, when he commanded the Ashanti expedition, winning decisively and returning home in two months. He was thanked by Parliament, and received also a grant of $125,000 and many honors. His name was at the time a household word, and he was everywhere recognized as Britain's foremost soldier.

Placed in command of operations against Arabi Pasha in Egypt in 1882, he conducted a brilliant campaign and defeated and captured Arabi at Tel-el-Kebir. On his return to England he was raised to the peerage as Baron Wolseley. He was again sent to Egypt in 1884 to rescue General Gordon at Khartum, but arrived too late, the defender of Khartum having been killed two days before. He was created Viscount Wolseley on his return and made commander-in-chief of the British army, in which capacity he did much to improve the methods of the English war office and increase the efficiency of the troops. F.ST.A.

**WOLSEY,** *wul'zi,* THOMAS (about 1475-1530), an English statesman and cardinal of the Roman Catholic Church, for years the most powerful man in England, whose ultimate downfall resulted because he trusted too much "to the power of princes." He was born at Ipswich, the son of a butcher without standing in his community. Thomas was sent to Magdalen College, Oxford, and was elected fellow of his college some years after his graduation; after his ordination to the priesthood in 1498 he became rector of Limington, in Somerset. It seems to have been easy for him to find patrons who would advance his interests; therefore by 1507 he had become chaplain to Henry VII. The king found Wolsey useful as a diplomatic agent, and frequently employed him.

Henry VIII at his accession made him royal almoner (alms dispenser) and bestowed upon him other ecclesiastical preferments, but it was not until 1511, when he became a member of the Privy Council, that Wolsey exercised a direct influence on the government. Before long his voice was the controlling one in all matters of state, so much so that he practically ruled the country. His ecclesiastical advancement continued also, for in 1514 he became bishop of Lincoln, and later in the same year Archbishop of York; in 1515 he received the cardinal's hat. He lived in royal state, exacted the utmost reverence and subservience from all who approached him, and made no secret of the fact that he hoped to be elevated to the Papacy. Like his royal master, he was lax in his morals, but he had undoubted qualities of statesmanship, and faithfully considered the king's interests in shaping his policies.

Most of his energies were devoted to advancing the cause of England in foreign affairs. At the outset of his ministry he favored France in opposition to the Holy Roman Empire, but later, when Charles V became emperor, he shifted and concluded an alliance with him against Francis I, hoping thereby to win the support of Charles in his struggle for the Papacy. When the Empire became so strong that it seemed to Wolsey to threaten the balance of power in Europe, he again took sides with France, thus involving England in a war with Charles.

Meanwhile, his unpopularity, always great, was increasing, and his enemies influenced the king against him, though it was not until a definite occasion arose that Henry really turned against his favorite. Wishing to secure a divorce from Catharine of Aragon, Henry committed the matter to Wolsey, who did not proceed energetically enough to please the impatient monarch. The result was that he was stripped of his honors, removed from his high place and forced to face a bill of attainder. This failed of passage by the Commons, but Wolsey was accused of treason and summoned to London to meet the charges. On the journey he died, and was buried at Leicester Abbey. In Shakespeare's *Henry VIII,* Wolsey after his downfall is made to say:

> Had I but served my God with half the zeal
> I served my king, He would not in mine age
> Have left me naked to mine enemies.

Consult Taunton's *Cardinal Wolsey;* Cavendish's *Life of Wolsey.*

**Related Subjects.** The following articles in these volumes will make clear certain references in the above discussion, and will give added information:

Attainder
Boleyn, Anne
Catharine of Aragon
Charles (Holy Roman Empire) subhead *Charles V*
Francis (France), subhead *Francis I*
Henry (England), subheads *Henry VII* and *Henry VIII*
Privy Council

**WOLVERINE,** *wool ver een'.* See GLUTTON.

**WOMAN'S CHRISTIAN TEMPERANCE UNION,** the world's largest organization formed exclusively of women, established for the purpose of organizing the work of temperance and social reform. In the United States the organization has been one of the leading forces in the country-wide movement for prohibition, and a great influence in the general promotion of social purity. Largely through the agency of the society there were secured many state laws establishing in the public schools the study of the effects of the use of narcotics and stimulants, and acts prohibiting the sale of tobacco to minors. It has also been instrumental in securing police matrons, industrial homes and houses of refuge for girls and women, and laws providing for their better protection.

The American organization was founded at Cleveland, Ohio, in 1874, as a result of a famous woman's crusade. In 1883 an international association, known as the World's Woman's Christian Temperance Union, was established, largely through the efforts of Frances E. Willard (which see), and branches are now maintained in many different countries. By 1903 the society had branches in every state in the Union, and there were over 10,000 local associations. The work is organized into forty distinct departments, each of which is under the supervision of women experts who are appointed as national, state, district, county and local superintendents. The address of the headquarters of the national society is Willard Rest Cottage, Evanston, Ill. The official badge is the white ribbon; the motto is, "For God and home and native land." In 1916 the society had a membership of about 500,000, including children's leagues, and there were 12,000 local unions.

**WOMAN'S RELIEF CORPS,** *kohr,* a patriotic organization founded in Denver, Colo., in July, 1883. The objects of the order are—

To aid and assist the G. A. R. and perpetuate the memory of their heroic dead; to find homes for the Union veterans, their widows and orphans, and to emulate the deeds of our army nurses; to maintain true allegiance to the United States of America; to inculcate lessons of patriotism and love of country among our children and in the communities in which we live; to encourage the spread of universal liberty and equal rights to all.

The organization is divided into local chapters, or corps, numbering 2,715, and the total membership is about 161,760. Once very prominent, it has been less conspicuous in recent years. Since its founding it has expended about $4,700,000. The headquarters are at Minneapolis, Minn.

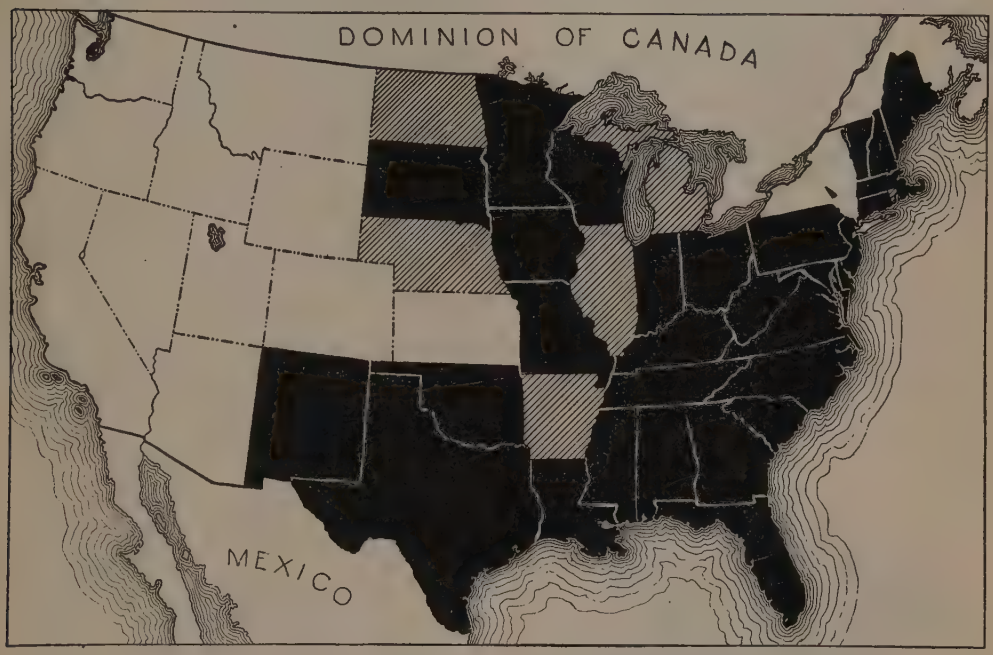
**WOMAN SUFFRAGE,** *suf'rayj.* It was over twenty-three hundred years ago that Euripides declared, "A woman should be good for everything at home, but for nothing away from it." Men as a whole have been reluctant to abandon his point of view; the average man thinks that if woman be granted a voice in the conduct of the nation she will decide the fitness of political candidates in Shakespearean fashion:

I have no other but a woman's reason:
I think him so, because I think him so.

To this the sentimentally inclined may reply in Voltaire's words, "All the reasonings of men are not worth one sentiment of women," while the more practical will assert that in places where women possess the vote they have shown themselves to be man's equal. It may be true that there are ignorant women voters, but there are likewise ignorant men, and as a rule the really telling arguments against woman suffrage apply equally well against democracy itself.

**The Woman's Movement in the United States.** Though the nineteenth century was the age of woman's struggle for recognition in politics, and the twentieth century marks the realization of her efforts, she had a slight share in governmental affairs before the English had been a hundred years on the American continent. Under the Old Province Charter of the colony of Massachusetts, from 1691 to 1780, women who were property holders were granted suffrage, and after a constitution was adopted they retained the right to vote for all officers except the governor and members of the legislature. The Continental Congress left the suffrage question to be decided by the individual states, but only one—New Jersey—conferred the franchise upon women, giving the vote to all inhabitants worth $250 or more. In 1807 this state limited the suffrage to "white male citizens."

The antislavery movement among the women of the North promoted the active demand for civic rights, and though the question of woman suffrage was widely ridiculed, it was also supported by a few prominent statesmen and preachers. The first convention to discuss votes for women met in 1848 at Seneca Falls, N. Y. Elizabeth Cady Stanton, Lucretia Mott, Martha Wright and Mrs. Mary Ann McClintock, the pioneer American suffragists, had framed a set of resolutions which included practically every demand since made for women, and which was adopted by the convention.




WOMAN SUFFRAGE IN THE UNITED STATES

In the states which are white, women have equal franchise with men at all elections. In five of the states shown in cross lines (North Dakota, Nebraska, Illinois, Michigan and Rhode Island) women can vote for President; in Arkansas they may vote at primary elections. The legislatures of Indiana and Ohio conferred suffrage upon the women, but the supreme court of Indiana and the voters of Ohio have reversed the action of the legislators. The states in black confine the franchise to men. This map indicates the suffrage situation in January, 1918.

In May, 1869, through the efforts of Mrs. Stanton and Susan B. Anthony, the National Woman's Suffrage Association was organized for the purpose of securing a national amendment extending suffrage to women. The following November the American Woman's Suffrage Association was formed with Henry Ward Beecher as president, its object being to secure suffrage through state amendments. In 1890 the two organizations united, and since that time have pursued both methods. Headquarters of the national organization, known officially as the National American Woman's Suffrage Association, have been established at New York, and in 1912 the Congressional committee at Washington began an active campaign to secure a Constitutional amendment granting national suffrage to women. In 1917 the Judiciary Committee of the House ordered the Susan B. Anthony Federal Suffrage amendment reported without recommendation. This amendment reads: "The right of the citizens of the United States to vote shall not be denied or abridged by the United States, or by any state on account of sex."

The results of the state action on the question of equal suffrage are summarized in the accompanying map. In 1909 there were but four equal suffrage states in the American Union. When America entered the War of the Nations eight years later, in April, 1917, eleven states had full suffrage. They were Wyoming (1869), Colorado (1893), Utah and Idaho (1896), Washington (1910), California (1911), Arizona, Kansas and Oregon (1912), Nevada and Montana (1914). In November, 1917, New York, by a referendum vote, approved a constitutional amendment granting its women the same suffrage rights as men. The Illinois legislature

in 1912 passed a law giving women the right to vote for Presidential electors, and for numerous other officers not provided for by the state constitution. Women in North Dakota, Michigan, Nebraska and Rhode Island have Presidential suffrage, and in Arkansas they may vote at the local primaries. Women have school, bond or taxation suffrage in nearly half the states, and in some towns and cities they have municipal suffrage. Full suffrage also prevails in Alaska. The election of Miss Jeannette Rankin of Montana, in 1916, to the National House of Representatives, was considered a victory for woman's rights.

The great majority of women active in suffrage work showed admirable loyalty and devotion to the government after America's entrance into the war, but an extreme faction of the Woman's Party aroused much resentment by "heckling" tactics. In 1917 pickets stationed at the White House grounds were repeatedly arrested, and occasionally they were mobbed by angry crowds. When placed in jail they followed the tactics of their militant sisters in England, and went on hunger strikes.

**In Canada.** Women have provincial suffrage rights in Nova Scotia, Ontario, Manitoba, Saskatchewan, Alberta and British Columbia, and in the other provinces there is municipal or

WOMAN SUFFRAGE IN CANADA

school suffrage. In 1917 the Dominion Parliament enacted a so-called war-time election bill giving Parliamentary suffrage to the mothers, sisters, wives, widows and daughters of men in active military service.

**In Other Countries.** In many foreign countries woman has received political recognition, and the stress of the War of the Nations has done much to advance her economic importance. Norway was the first European country to extend full suffrage rights to women and the privilege of holding office in Parliament. The women of Iceland, Finland and Denmark, Australia and New Zealand also have full suffrage; women may be elected to the Danish Parliament, and they constitute a considerable number of the members in the Finnish House and in the council at Iceland's capital. In November, 1916, the lower chamber of Holland voted to remove the sex barriers of suffrage. In Sweden women have had certain privileges of voting since the eighteenth century. The women of Great Britain vote in various local elections, and have excellent prospects of gaining Parliamentary suffrage. The militant suffragists declared a truce in their war for full rights at the outbreak of the War of the Nations, but the courageous and helpful work of the women during the struggle was so tremendous an argument for their enfranchisement that in 1917 the House of Commons went on record as favoring full political rights for them. In France a special committee in 1915 recommended full suffrage for women and asked that municipal suffrage be extended at once. In the Russian republic (1917) women were enfranchised.

The government of China is pledged to advance woman suffrage, which already exists in one of its provinces. In Rangoon, the capital of Burma; in Belize, the capital of the British Honduras, and in Bombay and Baroda, India, women have the municipal vote. B.M.W.

Consult, for favorable expressions, George's *Women and Tomorrow;* Spencer's *Woman's Share in Social Culture;* Mead's *What Women Might Do with the Ballot.* For opposing views, consult Wright's *The Unexpurgated Case against Woman's Suffrage;* Buckley's *The Wrong and the Peril of Woman Suffrage.*

**WOM'BAT,** a thickset, burrowing animal from two to three feet long, which inhabits Tasmania and Eastern and Southern Australia. In its native home the wombat holds the place that is occupied by the badger in other parts of the world. It is highly prized for its tough hide and long, coarse fur of a yellowish-black or grayish-brown color. The fur makes nearly indestructible rugs and mats, and the flesh is esteemed for food, having much the flavor of pork. These animals excavate large earth burrows as dwelling places, emerging only at night to feed on roots, vegetables and leaves,

THE WOMBAT

for they are strict vegetarians. But three species are found—the *common* wombat, the *hairy-nosed* and the *Tasmanian*. They belong to that order of mammals which carry the young in pouches (see MARSUPIALS).

**WOMEN'S CLUBS.** It is said that the matrons of ancient Rome used to meet to rule upon the social etiquette of the day, a fact which seems to indicate that women's societies are not strictly a modern development. The women's clubs of to-day, however, have a much wider field of action than those of any other period, and they exercise a far-reaching influence for good. According to their purpose and aim, they group themselves into four general classes, although with more or less overlapping of purpose.

**Social Clubs.** Probably there have been few ages since civilization began when women have not formed select circles to give them the means to enjoy a few hours of sociable sewing or embroidery and a "cup of tea," the time interspersed with conversation. However, as education began more and more to extend its advantage to women, with the opening of the universities to coeducation, these purely social gatherings frequently assumed a new character. With the recreation there was combined definite study along cultural lines—literature, art, travel, music, history, household economics, and the like. Almost every town had its women's Shakespeare society.

This literary-social class constitutes the large majority of women's clubs, their researches now extending into political economy, social reform, child study and kindred fields.

**Practical Clubs.** It has remained for these modern days to give a distinctly practical turn to the women's clubs—to put them to work, as it were—a result of the growing tendency to allow women a part in the management of the business of their communities. The earliest step in the direction of practical activities was taken by those societies which concerned themselves actively with church matters and with organized charities, and by patriotic societies like the Daughters of the American Revolution, working to preserve historical landmarks and relics. Then, out of the interest the social clubs had always shown in things educational, there flowered such practical benefits as free libraries, circulating rural libraries and better schoolhouses. The interest in child study and economics has broadened into effective agitation for legislation touching child labor, the eight-hour day for women, factory sanitation, pure food, milk inspection and other questions of vital importance.

For centuries women have been home makers. Now they are applying their wealth of experience to the solution of the problems of "municipal housekeeping." Their clubs have instituted "clean-up days" in thousands of towns, bringing order and cleanliness into back yards, vacant lots, streets and alleys. Everywhere they are working for playgrounds and for children's courts; for public markets and the use of vacant property as kitchen gardens for the poor; to reduce the cost of living; for better management of reform schools, prisons, asylums and charitable institutions, and for proper supervision of dance halls. Everywhere their determined campaigns in the interest of public health, happiness and morals are accomplishing great good.

**Political Clubs.** The agitation over woman suffrage has given rise to numerous political associations. Wherever suffrage has been granted, women's clubs prepare women for the right use of the ballot, conducting classes and preëlection meetings at which the different candidates are invited to present their views.

**Professional Clubs.** The admission of women to the professions naturally led to the organization of special clubs for women nurses, doctors, lawyers, and others. Press clubs for women writers exist in most of the great cities. In many places business women have organized luncheon clubs where home cooking is supplied at very low prices; many of these clubs have rest rooms and reading rooms in connection, and offer lecture courses and study classes.

**Canada.** Women in the Dominion are organized into clubs for social, political, business, journalistic, suffrage and trade-union purposes, and in connection with religion, art, music, literature and travel. One of the most prominent clubs is the Imperial Order of the Daughters of the Empire, which has 500 chapters and a membership of 30,000. This organization took a leading part in patriotic war work in Canada.

**General Federation of Women's Clubs.** This great national association originated in 1889 when the *Sorosis,* the oldest women's club in the United States, invited the various state federations to meet with it in general convention. The total membership is now close to 2,000,000, and the conventions held every two years are largely attended. Special leaders in charge of the different departments of activity outline programs, which form the basis for the work of the affiliated state groups. L.M.B.

**WOOD,** LEONARD (1860- ), a major-general in the United States army, under whose influence and authority military camps for college students and citizens' training camps, such as that at Plattsburg, N. Y., have been established. He is one of the few men who have attained such high rank in the United States army without having had a West Point education. After his early schooling at Pierce Academy, Middleboro, Mass., he attended Harvard University, from which he received the degree of Doctor of Medicine in 1884, and that of Doctor of Laws in 1903. He was appointed assistant surgeon in the army in 1888, and in twelve years rose to the rank of major-general of volunteers, being at that time the youngest major-general in the army.

MAJOR-GENERAL WOOD

In the Spanish-American War he commanded the First Cavalry, known as the "Rough Riders" and famous for the gallant charge at San Juan Hill; of this regiment Theodore Roosevelt was second in command. In 1898 Wood was awarded a medal of honor by Congress for distinguished service under Captain (later Major-General) Lawton, in the campaign against the Apache Indians.

He served ably as military governor of Cuba from 1899 to 1902, and as governor of the Moro province, 1903-1906, he restored order in the Philippines. In 1903 President Roosevelt appointed him major-general in the regular army. In 1906 he was placed in command of the Philippine division of the army, and in 1908 was made chief of the Department of the East, with headquarters in New York. In 1910 he was appointed chief of staff, holding this position until 1914, when he again was placed in command of the Department of the East. After the entrance of America into the War of the Nations General Wood was transferred to the Department of the South, with headquarters at Charleston, S. C. He is an ardent advocate of military preparedness, and is the author of *The Military Obligation of Citizenship* and *Our Military History*.

**WOOD ALCOHOL,** *al'ko hahl,* also known as WOOD SPIRIT, or METHYLATED ALCOHOL, is a colorless or slightly yellowish liquid, much like ordinary alcohol. It is called wood alcohol, or wood spirit, because it can be obtained by the dry distillation of wood, that is, by heating wood, bones, or other organic matter in closed vessels. It mixes with water in all proportions, and it is cheaper than ordinary alcohol. It is much used as a solvent of fats and oils, and in the manufacture of varnishes and dyestuffs. It is also employed for preserving specimens in museums of natural history. Wood alcohol is very dangerous to drink; a person drinking it runs the risk of blindness within the course of a few days. C.B.B.

**WOOD CARV'ING,** or sculpture in wood, is an art of great antiquity. As far as is known, the Egyptians were the first to practice it for decorative purposes, and in the early development of the plastic art it occupied an important position. Many of the specimens of the Egyptian craftsmen which have been preserved, dating from about 4000 B. C., are low reliefs of animals or plants and graceful patterns of the lotus and palm. The earliest examples of the Greeks, who developed their ideas of sculpture from the Egyptians, were crude wooden images of their gods; in many instances they combined wood with marble. Roman ornament is a continuation of the Greek and Etruscan styles. The prows of Roman war vessels and galleys were carved with the heads of animals, while their chariots were of varied carved ornamentation.

From the early years of the Christian Era wood carving was employed extensively in the decoration of churches. Panels and doors were carved with scenes from the Old and the New Testament. The doorways of the wooden churches of Scandinavia and Denmark, dating from the ninth to the thirteen century, are among the finest examples of early medieval wood carving. The fifteenth and sixteenth centuries were remarkable throughout all of Europe for the wood carvings used for ecclesiastic purposes. The wood carvings of Germany during this period were among the finest in the world; Nuremberg, especially, produced some of the greatest masters in the art.

The tendency to produce elaborate effects with the smallest outlay of money and labor has had a baneful influence upon the wood carving of modern times. It is, however, practiced with great skill in Switzerland and the Austrian Tyrol, while the Moslem carvers of Persia, Syria and Egypt execute beautiful panels and other decorations for ceilings, pulpits and all kinds of fittings and furniture. The mosques

and private houses of Cairo, Damascus and other Oriental cities are adorned with elaborate and minutely-wrought woodwork. The Chinese and Japanese also have produced wood carvings of great merit.

Manual skill, as well as an artistic sense, is essential to success in this art. The worker must have a knowledge of the shapes and uses of tools, and must put this knowledge to practical use in attaining artistic results. All of the finest wood carvings are executed by hand, and the woods in general use are oak, Italian and American walnut, lime, holly, pearwood, chestnut and mahogany. Wood for carving should be well seasoned, and it is essential that the natural sap be dried out to prevent it from rotting. The finishing depends much upon the wood used. Since so much of present-day ornamental woodwork is now made by machinery, this art, so rich in possibilities, has become one of comparatively small consequence. See CARVING. R.D.M.

Consult Rowe's *Practical Wood Carving;* Maskell's *Wood Sculpture.*

**WOOD'CHUCK.** See GROUND HOG.

**WOOD'COCK,** a group of birds belonging to the snipe family. The *American woodcock* breeds in the Northern United States and Canada, wintering in the South Atlantic and Gulf states. It is an early migrant, appearing

THE WOODCOCK

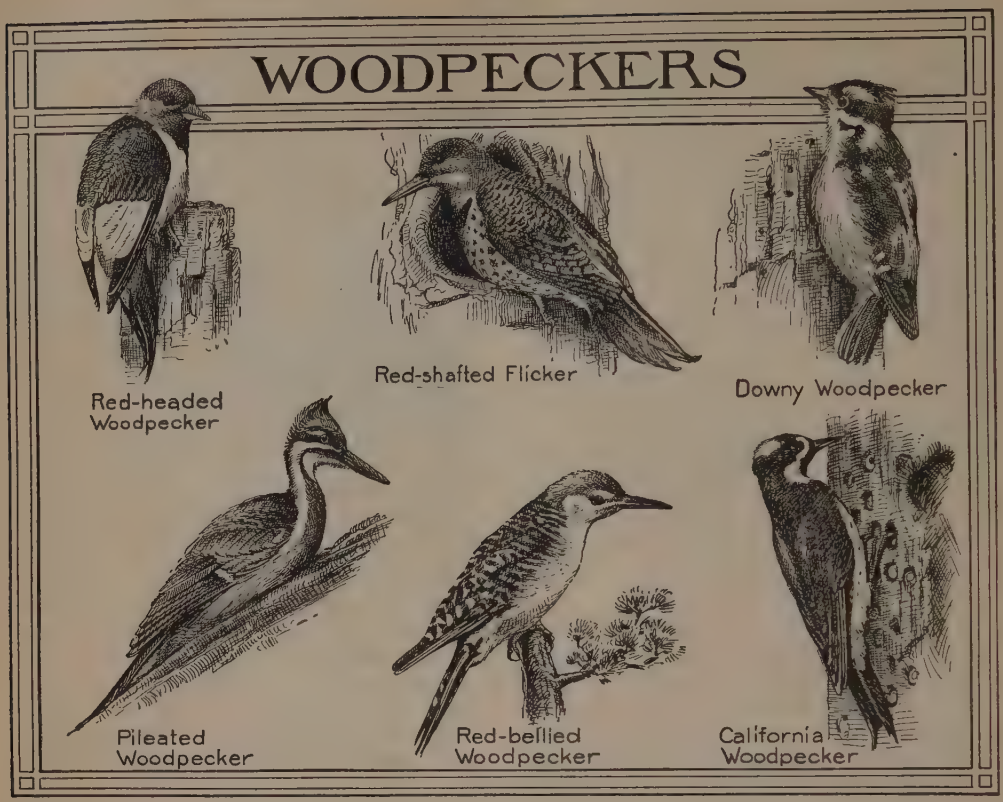
in its northern home the first of March. It makes a nest of dry leaves on the ground in the woods. The eggs are four in number, of a buffy color, marked with reddish-brown. This woodcock frequents corn lands near woods, where it finds soft, moist earth in which to probe for the earthworms that comprise its entire fare, a single bird devouring as many as half a pound of worms in twenty-four hours. Groups of holes, or borings, from which the woodcock has drawn earthworms, are a sure indication of its presence. It is a night bird, hiding during the day among leaves and grasses, where its wood-brown plumage, barred and mottled with black, protects it from discovery. If disturbed, it escapes with an uncertain, owl-like flight, and if the young are near, may feign lameness. It has also been known to carry away its young, one by one, holding them firmly between its thighs.

The *European woodcock* is a larger bird, and has been hunted as game until its numbers have greatly decreased. A small, dark-colored woodcock is found in Java and New Guinea.

**WOOD ENGRAVING,** *en grayv'ing.* Engraving (which see) is the art of cutting designs on a hard surface. Wood engravings are made to be employed on printing presses, like type, to reproduce in print the picture of the object engraved. They are made on Turkish boxwood, the hardest variety of wood known, and the one which has the most regular grain. The work is done on the end of the grain, the wood being sawed crosswise. Engraving tools, known as *gravers,* include *tint* tools, employed for cutting mechanical lines; *lozenge* tools, used for artistic lines; *elliptical* tools and *gouges.*

The design which is to be reproduced is sometimes sketched on the smoothed block of wood, and sometimes it is photographed on it. The engraver then cuts out the pattern, forming it on the surface of the wood by means of raised lines and dots. That is, the design is left in projection, and the background is cut away or lowered. The ink by which the pattern is transferred to the print paper is applied to the projections, in contrast with the procedure in line engraving, in which the ink is applied to the grooves (see page 2058). An engraved wood block gives the printer a surface similar to that of a page of type, and this is also true of the electrotype made from the wood engraving.

**WOOD'EN HORSE, THE.** After the Trojan War had gone on for ten years, it became clear to the Greeks that if they were to take Troy, it must be through stratagem and not through force, and the wily Ulysses was called upon to furnish a plan. On his advice the Greeks built a huge wooden horse, which they filled with Greek warriors and left upon the plains before Troy. Then the army took to their ships and hid themselves behind an island, out of sight of the city. The Trojans, finding the large and curious object, fell into a violent discussion as to whether or not it should be taken into the city, and were induced by the disaster which




befell Laocoön to receive it within their walls. They also took into the city Sinon, a Greek slave, who had been left behind for that very purpose. After nightfall Sinon released the imprisoned Greeks from the horse, and these in turn opened the gates of the city to the Greek soldiers, who had quietly returned. The city was then easily captured and destroyed.

**Related Subjects.** A fanciful, but current, illustration showing how the Wooden Horse may have appeared, will be found on page 5887. In connection with this subject the reader should consult the following articles in these volumes:

| | |
|---|---|
| Helen of Troy | Troy |
| Laocoön | Ulysses |

**WOOD'PECKER,** a bird of wooded areas, found in all parts of the world except Australia and Madagascar. Its toes are peculiarly arranged, two forward and two backward, and its tail feathers are stiffened in a manner which adapts it to climbing the trunks of trees. It has a stout, chisel-like bill with which it cuts into the wood of trees in search of borers and grubs, and a long, extensile tongue with a horny tip, with which it spears the insect and draws it out. Some species have the tongue coated with a sticky substance for the gathering up of small insects, as ants. The birds feed also on berries, fruits and nuts.

Woodpeckers have harsh voices, and their mating call is a rapid "drumming," performed with the bill on a dead limb or piece of loose bark. Their plumage is usually barred, or spotted black and white, or brown and black, and is marked about the head with red or yellow. They excavate cavities in the trunks of trees for nests, depositing their glossy white eggs on the fine chips at the bottom. They are somewhat solitary, except in the fall, when families go about together.

Among the woodpeckers of North America are the *ivory-billed woodpecker,* a wild, shy bird of large size, with high, scarlet crest, found in the cypress forests of the Southern United States; the *pileated woodpecker,* a somewhat smaller species of larger range, but, like the ivory-billed, destructive to trees; the *yellow-bellied sapsucker* (see SAPSUCKER); the *flicker* (which see), familiarly seen about dwellings, feeding on ants on the ground; the *red-headed woodpecker,* with conspicuous plumage of red, white and dark blue; the *hairy woodpecker*

and the *downy woodpecker,* two small birds resident through the year in the Northern United States and Canada. The *green woodpecker,* a gaudy species, is found both in South America and the British Isles. The *great-spotted woodpecker* is a handsome bird, found in Europe and Asia Minor. In South Africa is found the *ground woodpecker,* a singular species which feeds on the ground and excavates its nest in clay banks. M.A.H.

Consult Eckstorm's *The Woodpeckers;* Forbush's *Useful Birds and Their Protection.*

**WOOD PE'WEE,** a small bird of the flycatcher family, resembling the phoebe but distinguished from it by having longer wings than tail, by frequenting trees rather than barns and bridges, and by its more plaintive note, which sounds somewhat like *pee-a-wee.* It summers throughout the Eastern United States and Canada and winters in South America. It builds one of the daintiest of nests, weaving various plant fibers compactly together and covering the outside with lichens, placing it on the horizontal limb of a tree. The eggs are four in number, of a creamy-white color, speckled with brown.

THE WOOD PEWEE

**WOOD SPIRIT,** or **METHYLATED,** *meth'i la ted,* **SPIRIT,** a form of denatured alcohol, prepared by adding to one hundred parts of methyl alcohol ten parts wood spirits and one-half part of benzine. It is quite generally used as a fuel in engines and as a solvent. In the United States wood spirit is not subject to the ordinary taxes imposed on pure alcohol. See ALCOHOL, subhead *Denatured Alcohol.*

**WOOD'STOCK,** the county town of Carleton County, New Brunswick, in the central-western part of the province. It is on the right, or west, bank of the Saint John River at its confluence with the Meduxnekeag, and is on the Canadian Pacific and the Saint John & Quebec (operated by the Intercolonial) railways. The Saint John is navigable for small steamers both above and below the town, but there is no river traffic of importance. Woodstock is twelve miles east of the Maine boundary and sixty-three miles by rail northwest of Fredericton. Population in 1911, 3,856; in 1916, estimated, 4,800.

Woodstock is the center of a thriving agricultural district, and is also important for its manufactures, the chief of which are lumber, barrels and other wood products, starch, pork and foundry products. One of the largest establishments in the town is a tannery. A large supply of hemlock exists in the neighborhood, and there are also cedar and spruce. Interesting features of the city are an armory, completed in 1910, two hospitals, fine school buildings and the Dominion building, which dates from 1865.

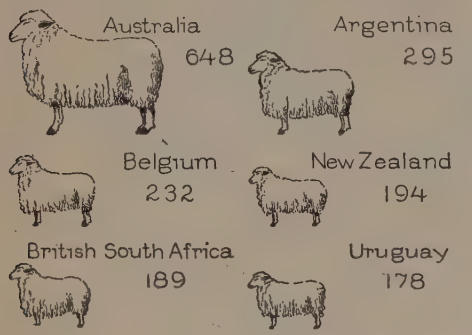
**WOODSTOCK,** a city in Ontario, the county town of Oxford County. It lies nearly midway between Detroit and Niagara Falls, on the main lines of the Canadian Pacific and Grand Trunk railways, and is on the line of the Grand Trunk which runs from Port Dover, on Lake Erie, to Owen Sound and other ports on Lake Huron and Georgian Bay. It is also the terminus of a branch of the Canadian Pacific which connects Woodstock with the Michigan Central and Wabash railways at Saint Thomas. By rail Woodstock is twenty-nine miles east of London, twenty-seven miles west of Brantford, and fifty-one miles east of Hamilton. Population in 1911, 9,320; in 1916, estimated, 11,000.

Woodstock is beautifully situated at the confluence of the Thames River and Cedar Creek. It is in the center of one of the finest agricultural districts in Ontario, and has a large market building and one of the best weekly markets in the province. The city is famous for its avenues of trees, which make a fine show during the summer months. Its attractiveness and healthfulness have made it a popular summer resort. It is more important, however, as a manufacturing community, its chief products being wagons and sleighs, furniture, pianos and organs and textiles. There are three piano and organ factories. Harness, cereals, flour, agricultural implements, wire fencing, automobiles, stoves and furnaces, munitions and soap are other important products. Woodstock was founded in 1850, and was incorporated as a city in 1901. It was named for Woodstock, the famous town in Oxfordshire, England, where Edward, the Black Prince, was born, and where England built Blenheim Palace for the Duke of Marlborough. J.M.

**WOOL,** the soft, modified form of hair which covers sheep and several species of goats. With the exception of cotton it is the most extensively used of all textile fibers. Affording

warmth without weight and also protection against extreme heat, it furnishes one of the most healthful coverings for man. The prevailing color of sheep's wool is white, but there are also gray, yellowish, fawn, brown and black shades. Wool is distinguished by its softness and its corrugated and spiral structure, which renders it wavy or curly.

The most important producers of wool are the numerous varieties of sheep, the finest quality being yielded by a breed descended from the fine-wooled merino and the long-wooled species, such as the Lincolnshire or Leicester breeds of England. Alpaca, the mohair yielded by the Angora goat, and the soft, curly hair of the camel are other important commercial wools, but the finest and most costly grade is that of the Cashmere goat, from which the soft, silken Persian rugs and shawls are made.




LEADING COUNTRIES AND STATES IN WOOL PRODUCTION

The annual wool clip in the United States is about 290,000,000 pounds—between that of Argentina and Belgium.

The quality of wool depends not only upon its fineness, curl, length and luster, but also upon its elasticity, and delicate machines have been invented for testing its elastic quality. Neglect of sheep and insufficient feeding cause the growth of uneven, hairy coats, the fibers of which contain weak spots and are dry and inelastic. In healthy sheep the wool is covered with a fatty or greasy substance which prevents matting and protects the fibers from dust and other injurious substances.

Lamb's wool is softer and more wavy than sheep's wool, and it brings a higher price. The finest and most even part of the fleece is on the shoulders and back; on the neck and top of the shoulders the wool is not so close and long, and on the flanks it is coarse. The poorest wool, known as *breach wool* and used only in the coarsest yarns, grows in thick, uneven tufts on the hind legs. *Fleece wool* is that clipped from the live animal, and *pulled wool* is obtained from the pelts of slaughtered sheep.

According to its quality and its use in manufacture, wool is sorted into several classes. The short, curly fibers used in the making of felt and long-napped materials is known as *carding wool;* the fibers from four to eight inches in length, used in the manufacture of worsteds, are called *combing wools,* and the coarsest and strongest varieties are called *carpet* and *blanket wools.* The American method of preparing wool for the market is inferior to that practiced in Australia and New Zealand, where it is sorted and classed when sheared and is packed in uniform bales of fibers of the same grade. In 1915 an organization of Wyoming and Utah sheepmen established a model plant to demonstrate the value of the Australian method.

All improved breeds of sheep are raised in the United States, and the Union is among the world's leading wool-producing countries. The annual wool clip of the states is about 290,000,000 pounds, of which over 280,000,000 pounds, besides an import of over 308,000,000 pounds in normal years, are consumed by American factories. For rank of leading states and countries in the wool production, see chart.

**Woolen Manufacture.** After the wool is received at the factory it is sorted, then beaten and thoroughly scoured and cleansed in vats containing a steaming solution of soft water and soap. It is dried on a wire netting by currents of warm air, and after all impurities have been removed, that used in fabrics, known as "dyed in the wool," is dyed. The tufts of fibers are loosened by a teasing machine which consists of a revolving drum in which sets of hooked teeth move in opposite directions, tearing the wool into fine fibers. The wool is then oiled to restore its natural pliancy, and is run through a series of three carding machines. These are cylinders studded with teeth, which straighten and interblend the fibers, finally casting them out in the form of a continuous, flat band. The condensing machine reduces the

band to a soft, loose cord, or sliver, a little larger than heavy crocheting yarn. This sliver is then spun into a twisted thread on a mule jenny, and the threads are wound on spools and are ready for the loom.

After the cloth is woven in any desired pattern it is washed and redyed, if necessary. The nap is raised and trimmed by a teaseling and shearing machine, and the goods are pressed between iron plates in a hydraulic press.

In the making of worsteds, after the long fibers are carded they are combed, or gilled, before they are spun into the tightly-twisted yarns.

Before the War of the Nations Great Britain led the world in the manufacture of woolens, but in the year 1915 the United States surpassed all other countries in the production of woolen, worsted and felt goods. The five states leading in this industry are Massachusetts, Pennsylvania, Rhode Island, New Jersey and New York.

**History.** The different kinds of cloth made from wool by the ancients were described by Pliny, the Roman naturalist, and it was from Rome that the manufacture of woolen textiles spread to Spain, the Low Countries and England. During the Middle Ages the industry grew to large proportions on the Continent, and in England it became the country's very "strength, revenue and blood." The guilds organized among the weavers, combers and fullers became a prominent factor in political life. The export and import of wool and woolen goods were regulated by law, and it was not until 1825 that the law prohibiting export was finally repealed. In the latter part of the nineteenth century the various branches of the industry were united, and the production of homespuns, or wool prepared in the home, rapidly disappeared.

The first successful woolen mill in the United States was established at Newbury, Mass., in 1790. By the end of the nineteenth century all of the chief improvements in the machinery used in the manufacture had been introduced, and the industry developed rapidly in the following years. E.B.P.

Consult Ford's *Wool and Manufacture of Wool;* Marshall's *The Wool Grower and the Wool Trade* (Bulletin 206, U. S. Dept. of Agriculture); Rushworth's *The Sheep.*

**Related Subjects.** The following articles in these volumes will be of interest in this connection:

Adulteration of Foodstuffs and Clothing
Alpaca
Broadcloth
Cashmere Goat
Dyeing and Dyestuffs
Felt
Fiber
Flannel
Mohair
Sheep
Shoddy
Spinning
Teasel
Tweeds
Weaving
Worsted

**WOOLFLOWER,** *wool'flour,* CHINESE, a gorgeous new garden plant brought from China to America since the year 1910. It grows as a bush from two to three feet high, and the stem ends bear huge balls of deep crimson, wool-

THE WOOLFLOWER

Above, appearance of the plant in blossom; below, single flower clusters.

like bloom. Along the stems appear smaller branches, each with its ball of scarlet. The plant promises to be very popular, for it is easily cultivated, and the blossoms, which mature early in July, grow continually deeper in color until they are touched by the frost.

**WOOLSEY,** *wool'si,* THEODORE DWIGHT (1801-1889), an American educator, university president and forceful writer on educational topics. He was born in New York City, and was a descendant of Jonathan Edwards. In 1820 he was graduated at Yale University, and thereafter studied law in Philadelphia and theology at Princeton College, though he was not ordained a clergyman until a quarter of a century later. For a time he was a tutor at Yale, then studied Greek in Europe, and in 1831 became professor of Greek at Yale. Fifteen years later he was chosen president of that institution, which under his administration increased

its material prosperity and broadened its scope. During the years of his professorship he had published editions of some of the great Greek tragedies, the *Alcestis* of Euripides, the *Antigone* and *Electra* of Sophocles and the *Prometheus* of Aeschylus, but after he became president he turned his attention to history and international law, on which he became a recognized authority. His publications during this later period include *An Introduction to the Study of International Law, Essays on Divorce and Divorce Legislation, Political Science* and *Communism and Socialism.* He resigned the presidency in 1871, and for ten years thereafter was chairman of the American commission for the revision of the authorized version of the Bible.

**WOONSOCKET,** *woon'sok et,* R. I., ranking next to Providence as an industrial center, is known for its manufacture of cotton and worsted goods. It is in Providence County, in the northeast corner of the state, sixteen miles north and west of Providence, thirty-nine miles southwest of Boston, on the Blackstone River and on the New York, New Haven & Hartford Railroad. There is also interurban service. The population, which in 1910 was 38,125, had increased to 44,360 (Federal estimate) in 1916. Woonsocket contains Sacred Heart College, the Harris Institute Library, a Y. M. C. A. building, public parks and a soldiers' monument. In addition to its large cotton and woolen mills, the city has rubber mills, wringer works and machine shops. The town was settled about 1666, was incorporated in 1867, and became a city in 1888. Smithfield was annexed in 1871.

**WORCESTER,** *woos'ter,* Mass., one of the county seats of Worcester County (Fitchburg being the other) and next to Boston the largest city in the state. It had a population of 145,986 in 1910 and of 163,314 (Federal estimate) in 1916. In value of manufactured products Worcester ranks third among the cities of the state; a local estimate of the value of the factory output in 1916 was $110,000,000. It is a little east of the center of the state, and is forty-four miles southwest of Boston and fifty miles northeast of Springfield. It is on the Boston & Albany, the Boston & Maine and the New York, New Haven & Hartford railroads, and on interurban lines.

The area of the city is thirty-seven square miles. It is situated about 500 feet above sea level, in a valley surrounded by low hills. The ten parks, the largest of which are Green Hill Park (500 acres), Lake Park (110 acres), in the eastern part of the city, and Elm Park (86 acres), have a combined area of 1,000 acres. Public buildings of note are a Federal building, a city hall, erected at a cost of $650,000, a granite courthouse, the Central Public Library and three branch libraries, the Library and Museum of the American Antiquarian Society, an art museum, erected and endowed by Stephen Salisbury, a state armory, and Y. M. C. A. and Y. W. C. A. buildings. Splendid educational advantages are offered by Clark University, Clark College, College of the Holy Cross, Worcester Polytechnic Institute, Worcester Academy and a state normal school and kindergarten training school. Here is located the state insane asylum. The City, Memorial and Saint Vincent are among the leading hospitals.

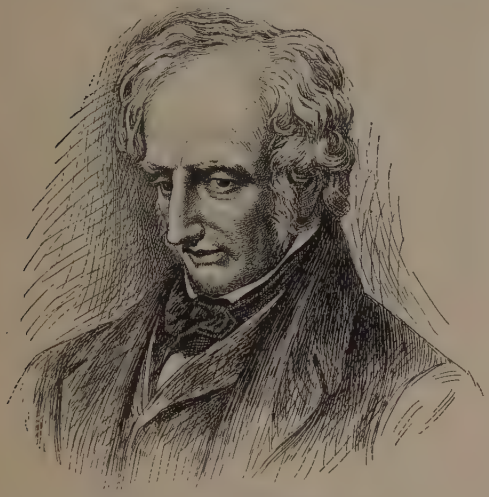
The manufactures of Worcester are varied. The leading products are wire, machine tools (6,000 men are employed in the manufacture of the first, 12,000 in the manufacture of the second), corsets, women's underwear, leather belting, automobile accessories, emery and abrasive wheels, shoes, roller skates, envelopes, railway cars, carpets, vacuum cleaners and thread. The manufacture of woolen and worsted goods, printing and publishing, and slaughtering and meat packing are also important industries.

About 1670 a settlement, Quinsigamond (or Quansigamog) Plantation, was made here, but was abandoned upon the outbreak of King Philip's War in 1675. The place was settled again in 1684, and the name was changed by members of the company, who came from Worcester, England. The settlement was nearly destroyed by Indians in 1702, but survived, and in 1722 was incorporated as a town and became a city in 1848. In Worcester and the near vicinity have been the homes of a number of noted inventors, among whom are Eli Whitney, Elias Howe, Samuel Crompton and L. J. Knowles. W.J.D.

**WORDEN,** *wur'den,* John Lorimer (1818-1897), the American naval officer who commanded the *Monitor* when that ship defeated the Confederate ironclad *Merrimac* in Hampton Roads, on March 9, 1862. (A picture of the two vessels is shown on page 3890.) Worden was born in Westchester County, N. Y. Having joined the navy as a midshipman at the age of seventeen, he gave a good account of himself and was commissioned a lieutenant in 1846. During the famous fight in Hampton Roads he was partially blinded, but he continued in the service, and was later given com-

mand of the ironclad *Montauk*. In this capacity he destroyed the Confederate ship *Nashville* in February, 1863, and on April 7 aided Admiral DuPont in an attack on Charleston. He was promoted to the rank of commodore in 1868 and to that of rear-admiral in 1872. In 1886 he retired.

**WORDSWORTH,** *wurdz'wurth,* WILLIAM (1770-1850), an English poet, the greatest of the Lake School. He was born April 7, 1770, at Cockermouth, Cumberland, of an old and respected family of England. At the age of



WILLIAM WORDSWORTH

Nothing is ugly or commonplace in his world; on the contrary, there is hardly one natural phenomenon which he has not glorified by pointing out some beauty that was hidden from our eyes.
—LONG.

eight he was sent to the grammar school at Hawkshead, in the Esthwaite Valley, where he remained for nine years, spending much of his time in out-of-door sports or in still more enjoyable walks through the hills. Even in these early years his love for nature was almost a passion, and it grew with his growth until he merited the name which has been applied to him—"the high priest of nature." From 1787 to 1791 he was a student at Cambridge, where he did nothing to prove himself in any way remarkable.

**Effect of Continental Travel.** During the vacation of his third year at the university Wordsworth made a short Continental tour, and soon after his graduation traveled again to Europe, which was at that time stirred by the French Revolution. Coming under the influence of the liberal ideas in which that struggle had begun, Wordsworth became an ardent republican and remained in France until 1792, when he was recalled to England by relatives who withheld from him his income that they might check his too liberal tendencies.

Radical as he had been, however, he was far from being in sympathy with the excesses into which the Revolution ran, and gradually became again a conservative in politics. Byron, Shelley and other fervent upholders of revolutionary principles were much wrought up over his defection from their ranks, and Browning, in his *Lost Leader,* shows their attitude toward him. No such reason, however, as Browning gives really caused the change in Wordsworth—he was influenced by no "ribband to stick in his coat."

**The Lyrical Ballads.** In 1793 appeared Wordsworth's first poems, his *Descriptive Sketches Taken during a Pedestrian Tour among the Alps.* The poet had not yet evolved the principles which guided him in his later work, and these *Sketches* were modeled largely on Pope, though in their occasional accurate pictures of natural scenes they give hints of the real genius of the author. Two years later the poet was enabled by a friend's bequest to make a home with his sister in the Lake Region. In 1797 they removed to Alfoxden, near Nether Stowey, where Coleridge lived. The two men were quite unlike, but they developed a warm friendship and were much in each other's society. The results of their association were shown in the *Lyrical Ballads,* published in 1798, in which appeared, with other poems, Coleridge's *Ancient Mariner* and Wordsworth's *We Are Seven* and *Lines on Tintern Abbey.* Criticism was plentiful and appreciation very rare, but in the light of later developments it is clear that this little volume marked the beginning of a new epoch in English poetry. Shortly after the book was published Wordsworth and his sister went with Coleridge to Germany, to spend the winter of 1798-1799. Here Wordsworth wrote some of his finest poems.

**At Grasmere and Rydal Mount.** On their return to England the Wordsworths settled at Grasmere, where several years were spent in the seclusion and the communion with nature which more than anything else Wordsworth's genius needed. In 1802 he married Mary Hutchinson, whom he had known since boyhood, and in 1813 he removed with his wife and sister to Rydal Mount, where he remained until his death. In the same year he was made collector of stamps for Westmoreland and Cumberland, and was thus afforded an income

which fully sufficed for the somewhat frugal life of the family. During his remaining years he made several tours on the Continent and through England and Scotland, accompanied sometimes by members of his family, sometimes by friends.

**Appreciation Came Slowly.** Very slow indeed were the critics and the public to admit the genius of this man whose poetry differed so radically from almost everything that had

RYDAL MOUNT

preceded it. From the time of the publication of a second edition of the *Lyrical Ballads,* in 1800, when his theory of poetry was made known in a celebrated *Preface,* he was met for thirty years with harsh and almost uniformly unappreciative criticism. During this period, however, he gained the loyal support of friends, notably of Coleridge, Southey, DeQuincey, Lamb and Keats; and, confident of his own power, he continued to produce the poems which finally changed the idea of the very nature of poetry itself, replacing the artificialities which the previous age had demanded with simplicity and naturalness.

**Became Poet Laureate.** In 1843 he was honored by Victoria with the laureateship. Among the poems which show Wordsworth at his best are the *Ode on the Intimations of Immortality,* the *Ode to Duty, The Happy Warrior, The Solitary Reaper, The Daffodils* and his sonnets. *The Excursion,* a lengthy poem which is at times tiresome, and *The Prelude,* an autobiographical poem, contain many beautiful passages, but as a whole they do not approach the shorter lyrics. Of almost every poet who ever wrote it is true that his work is uneven and that he left some things which add nothing to his fame; but this is true in a higher degree of Wordsworth than of most poets. Some of his poems, especially of the earlier ones, are almost ludicrous in their striving after simplicity; but the larger part of his work is such that he deserves to be ranked with the very greatest English poets—immediately after Shakespeare, Milton and Chaucer, perhaps.

**His Views of Poetry and Life.** It was Wordsworth's expressed belief that the language of poetry should not differ greatly from the language of prose. His aim was to choose his subjects and his characters from everyday life, and to use the language of the people, depending for poetic beauty on imaginative coloring and the poet's interpretation of nature and life. His style is, indeed, remarkably simple, but his diction is very often far removed from that of commonplace prose.

It is as an interpreter of nature and of the brotherhood of man that he stands supreme. To him nature seemed a living and intelligent being, capable of communicating with man, and worthy of all admiration; and in the very humblest lives he found a nobility, a strength, that proved to him the equality of man. Such a poem as *Michael* is a masterpiece by reason of its sympathetic comprehension of the worth and dignity of the life of an humble shepherd. As a writer of sonnets Wordsworth is the greatest of English poets since Milton. A.MC C.

Consult Winchester's *William Wordsworth: How to Know Him;* Robertson's *Wordsworth and the English Lake Country.*

**WORKMEN'S COMPENSA'TION LAWS,** statutes designed to protect the workman from loss due to injuries which were the result of his trade or occupation. For a detailed account of the principles and operation of such laws, see EMPLOYERS' LIABILITY.

**WORLD'S COLUM'BIAN EXPOSI'TION,** THE, a great international exhibition held in Chicago in 1893, in which all the nations of the world joined with America to celebrate the 400th anniversary of its discovery. Columbus had landed on the island of San Salvador, supposed to be the present Watling's Island, on October 12, 1492—the birthday of the New World. The corresponding date in the New Style calendar is October 23; and on that day, in the year 1892, the magnificent World's Fair of Chicago was formally dedicated. It was not completed, however, until May 1, 1893, when President Cleveland touched the electric button that unfurled the official flags and set the machinery in motion. For six months people from all over the world streamed through the gates of this wondrous "City Beautiful," drinking in its glories and absorbing the rich educational benefits it bestowed.

Never before had an undertaking of this kind been carried out on such a vast scale. The Exposition had been two years in the making, not including the time required for planning and advertising. On February 25, 1890, Congress had passed a bill awarding the Exposition to Chicago—over the claims of many rivals for the honor—and providing liberal financial aid. It also authorized a World's Columbian Commission, which consisted of delegates from the different states and territories, with Thomas W. Palmer, former Senator from Michigan, as president. An ideal site was found in spacious Jackson Park, on the shores of Lake Michigan, in the southern part of the city. To this were joined an additional stretch of beach, giving a water line of fully two miles, and a broad boulevard—christened the Midway Plaisance—connecting Jackson Park with the neighboring Washington Park. Altogether, the Exposition occupied 666 acres.

**Buildings.** As one entered the grounds, the main buildings appeared like fairy palaces. They were built of a composition called *staff,* largely plaster of Paris, which made them gleam like marble, so that people came to speak of this wonderland as the "White City." It was a liberal education in architecture to study these buildings, for they represented many different types—classic, Renaissance, Spanish, rustic and modern.

The largest of them all—in fact, the biggest exposition building ever constructed up to that time—was the Manufactures and Liberal Arts Building, covering nearly forty acres. The Transportation Building, with its imposing Golden Doorway, furnished in its exhibits an inspiring object lesson on how the world goes a-traveling, beginning with the most primitive vehicles and bringing the lesson by degrees, through models of the Viking ship, the *Pinta, Nina* and *Santa Maria* of Columbus' fleet, the George Washington coach, and so on, down to the marvelous steamers, battleships, locomotives and other conveyances of the modern day. The Forestry Building needed no name over its entrance, for its columns, the unfinished trunks of trees brought from different states and countries, told its story. The Palace of Fine Arts, sheltering a remarkable art collection, was built for permanence and later was known as the Field Columbian Museum of Natural History (see FIELD COLUMBIAN MUSEUM). A point of interest in connection with the Woman's Building was that it was designed by a woman architect.

Other interesting structures were Machinery Hall and the Administration, Agricultural, Electrical, Government, Horticultural, Mines and Mining, and Fisheries buildings. The state building of Virginia was a replica of Mount Vernon, the beloved home of Washington; that of Massachusetts, a copy of John Hancock's house; that of Florida, a model of Fort Marion. Many of the foreign buildings were typical of the national architecture; for instance, the Swiss chalet, the English manor house, the quaint Swedish and German country houses. Spain's contribution was peculiarly in harmony with the spirit of the Exposition, for it was a faithful copy of the Convent of La Rabida, which knew Columbus the Mariner before ever he became Columbus the Discoverer. The convent was retained after the exposition as a fresh-air sanitarium for children.

**Special Features.** The *Midway Plaisance* was a place for fun and frolic, a fascinating avenue of adventure, the home of all the strange sights and sounds of all the world. Here were grouped hundreds of popular amusement features, above them towering the great *Ferris Wheel,* with its swinging coaches in which one could be carried 264 feet into the air. One could circle the globe in the space of an afternoon, for here were the Streets of Cairo, the Moorish Palace, the Japanese Bazaar, the Irish, Javanese, Eskimo, Samoan and Dahomey villages, and duplicates of many other sights.

A favorite resort, too, was the *Wooded Island,* set like a jewel in one of the several lagoons, with its Japanese tea houses and its festoons of colored lanterns swinging amid the trees and the roses. Grouped about the lagoons, and in the great open space known as the *Court of Honor,* were fountains, arches, columns and sculptured groups that lent added beauty and richness to the grounds. The *MacMonnies Fountain,* the colossal statue of *The Republic,* by French, and the sculpture called *The Triumph of Columbus,* were some of the most remarkable art features of the Exposition.

Many international conventions for the discussion of world questions along scientific, educational, philosophic, commercial and other similar lines were held during the Exposition, under the direction of a special committee called the World's Congress Auxiliary. One of these congresses, the *World's Parliament of Religions,* was particularly interesting because to it came delegates representing nearly every religious faith now practiced.

**A Few Statistics.** The total attendance at the Exposition was more than twenty-seven and a half million people, the average daily attendance being 172,712. The best single day's record was that of 716,881 on "Chicago Day", October 9, the anniversary of the burning of the city. There was a profit of about $1,850,000 on the books when the Exposition closed—a practical tribute to the enterprise and splendid management of those who had its affairs in charge. Fitting closing ceremonies had been planned for October 30, but they were abandoned on account of the assassination, on October 28, of Chicago's mayor, Carter Harrison.

The World's Columbian Exposition set a new standard for exhibitions of its class. It was a worthy expression of the energy, enthusiasm and resources of the New World. L.M.B.

**WORLD WAR.** See WAR OF THE NATIONS.

**WORMS,** *wurmz,* the common name for the parasites which inhabit the human body, and which the scientist calls *entozoa.* The latter name refers to their wormlike shape. Of the various kinds the ones most generally known are the *pinworms,* or *seat worms,* found in the lower bowel and rectum of children, the *tapeworm* and the *trichina.* Pinworms cause pain in the rectum, itching and straining. These troublesome parasites may be destroyed by injecting quassia into the rectum. The tapeworm and trichina are described under their respective headings. C.B.B.

**WORMS,** *vohrms* (in English, *wurmz*), one of the oldest cities of Germany, beautifully situated in a productive Rhine district in the grand duchy of Hesse, twenty-two miles north of Heidelberg. Worms is of historical importance as the place of convocation of many German diets, notably that of 1521, when Martin Luther appeared before Charles V and refused to retract the statements expressed in the ninety-five theses (see LUTHER, MARTIN). An imposing monument to his memory was erected in the Luther Platz in 1868. The scene of the Nibelungenlied (which see) is laid at Worms. Among the chief places of interest because of their antiquity are the Cathedral of Saint Peter, founded in the ninth and carefully restored in the nineteenth century; Saint Paul's Church and Saint Paul's Museum, which contains a unique Luther library; a synagogue built in Romanesque style, dating from the eleventh century, and the Church of Our Lady, a late-Gothic edifice of grace and beauty. In the vicinity is produced the celebrated wine known as *Liebfraumilch.* The vineyards on the hill that shuts in Worms to the south yield some of the most delicious wines of the Rhine.

During the Middle Ages Worms was a very populous as well as a great commercial city, but it was almost entirely destroyed by the French in the war of 1689, and although rebuilt on a less extensive scale it has never regained its former prosperity. Population in 1910, 46,819.

**WORMS,** or **VERMES,** *vur'meez,* that branch of the animal kingdom which includes limbless, creeping, invertebrate animals. Their bodies are long, cylindrical or flat, and are divided into many segments. Various species, such as the common earthworm, are found living in the soil; others, such as the leech, live in water, and many are parasites living in the bodies of other animals. In this latter group are the tapeworm, which infests the intestines of human beings, and the trichina, a hairlike worm which lives in the bodies of swine and other animals. The term *worm* is also applied to many caterpillars, maggots, grubs and other forms of insect larvae. The scientist Linnaeus first used the term *Vermes* to designate a subkingdom of animals, but included in his division all of the lower invertebrate animals but the insects.

**Related Subjects.** Not all of the following are worms in the scientific sense of the term, but all are called worms. Articles on all of these appear in these volumes:

| | |
|---|---|
| Cankerworm | Measuring Worm |
| Caterpillar | Tapeworm |
| Earthworm | Trichina |
| Hookworm | Wireworm |
| Leech | Worms |
| Lobworm | |

**WORM'WOOD,** a perennial herb of the composite family, bearing an erect, hairy stem from two to four feet high, and coarse, much-divided gray leaves. The small, yellowish flowers grow in compact, rounded heads. The herb, mentioned in the Bible and elsewhere as a symbol of bitterness, is aromatic, and is the source of a bitter oil used extensively in the manufacture of a French liquor called *absinth* (which see). In Europe wormwood is used to some extent as a remedy for indigestion. The plant is native to Asiatic Russia and Europe, and has been introduced into the United States and Canada.

**WORSTED,** woolen thread spun from long combed, staple wool, and twisted hard in the spinning. The name is derived from Worsted, a village in Norfolk, England, where it was first manufactured. It is woven, or knit, into

stockings, carpets and other coarse fabrics, and finer varieties are used in the manufacture of cloth for men's and women's clothing. It is made in a wide variety of colors and mixtures of colors in the same yarn. Worsteds, being of long hair carefully combed, are rougher and usually heavier than ordinary woolen goods.

For the processes which make the differences between worsteds and other woolens, see WOOL, subhead *Woolen Manufacture.*

**WOUNDS,** *woondz,* lacerations of the flesh, in any degree, the visible results of injuries. Cuts, skin abrasions, burns and internal lacerations are among the different kinds of wounds. Pain, bleeding, fever and the nervous condition called *shock* are accompaniments of severe wounds, and blood poisoning and suppuration (the formation of pus) are frequent complications. Wounds heal with different degrees of rapidity, according to their cause and seriousness, the general health of the patient and the character of the treatment given him. The War of the Nations gave opportunity for a complete testing of all modern theories as to treatment of wounds, and the reports of military surgeons furnished valuable information on the subject. From 1915 on, what is known as *Dakin's solution* was used extensively by French surgeons for irrigating wounds. This is an antiseptic solution made up of chlorinated lime, sodium carbonate (dry), and sodium bicarbonate. A report (1916) of a prominent hospital surgeon brought out the point that a high percentage of deaths from wounds was due to infection from the projectiles or fragments of clothes soiled with mud and filth.

**First Aid to the Injured.** In case of the infliction of a wound resulting in free flowing of blood the first step taken should be to stop this loss. A tourniquet (described on page 5849) should be applied at once, or a cloth should be very tightly fastened around the injured member just above the wound. If the physician is late in arriving and from the nature of the wound infection is threatened, antiseptics may be applied, but with extreme caution; if applied in too strong a form serious complications may result. The commonest antiseptics are carbolic acid, in very weak solution, iodine, iodoform and lysol.

If breathing is difficult the victim's clothing should be loosened and plenty of fresh air assured. See SURGERY; ANESTHETIC; ANTISEPTIC.

In other articles in these volumes are simple directions for first aid in connection with accidents of various kinds. C.B.B.

**WREN,** *ren,* a subfamily of small, active birds, with slender beak, rounded wings and erect tail, abundant in the Americas, especially in the mild sections. The plumage is brown or grayish, barred and mottled with black. Wrens live near the ground, and are almost always in motion. Their food consists very largely of insects. They have marvelous powers of song, and also very commonplace and disagreeable, scolding voices, which they use freely on the slightest occasion. Of the wrens that reach the United States, the largest is the *cactus wren,* found in the arid regions along the southwestern border. The *rock wren* nests in the dry foothills of the Rocky Mountains and westward. The *Carolina wren* is a shy species of the Southern states, with a clear, ringing note which sounds like *whee-ùdel, whee-udel, whee-udel,* endlessly repeated. *Bewick's wren* is similar to the Carolina, but is not so shy. The *winter wren* is the tiniest species, being only four inches long. The *long-billed* and the *short-billed marsh wrens* nest among reeds and cat-tails in marshes. The *house wren* is a bold bird, nesting in bird houses and holes in trees about buildings, and is valued for its sociability and insect-destroying habits. Its eggs are five to nine in number, white in color, profusely dotted with salmon.

Among the dwellings framed by birds
In field or forest with nice care,
Is none that with the little wren's
In snugness may compare.
—WORDSWORTH: *A Wren's Nest.*

The illustration is that of the house wren.

Consult Forbush's *Useful Birds and Their Protection.*

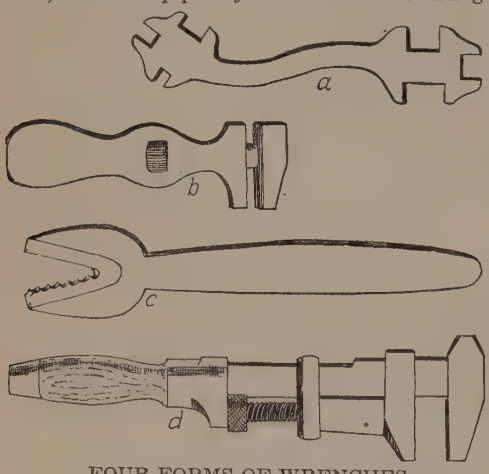
**WREN,** SIR CHRISTOPHER (1632-1723), an English architect, born in East Knoyle, Wiltshire. When at Oxford, where he received his education, he won distinction for his work in geometry, and in 1660 he was made Savilian professor of astronomy in that institution. His work as an architect early became known, and he was one of those commissioned to rebuild the old Saint Paul's Cathedral of London. He had scarcely more than submitted plans for it when the great London fire of 1666 occurred. This caused the complete ruin of the building, and gave Wren the opportunity to rebuild it entirely; this task brought him permanent

fame as the greatest of English architects and required the best of his time and efforts between the years 1675 and 1710.

During the forty years following the great fire there was hardly a building erected in or near London that had not been planned by him. Among his city churches are Saint Stephens, Saint Michael's, Saint Mary-le-Bow and Saint Bride's. He also designed the Custom-house, the old Royal Exchange, Marlborough House, Buckingham House, the Sheldonian Theater at Oxford, the library of Trinity College, Cambridge, and Queen's College chapel. He was in the habit of specializing on some principal feature of the building, and his churches are especially known for their graceful and artistic spires. The designing of several buildings in America has been attributed to him, among them a church in New Haven, Conn., and the main building of William and Mary College.

All his work is characterized by harmony of proportion, simplicity and gracefulness of line. He was knighted in 1673 by Charles II, served in Parliament for several years, was elected president of the Royal Society in 1681, and when he died was buried in Saint Paul's, where a tablet, indicating his resting place, bears the appropriate epitaph: "If thou seek his monument, look about thee."

**WRENCH,** *rench,* a tool for turning bolts, nuts, screws or pipes by the force of a twisting strain. It is sometimes simply a bar of metal with angular jaws or a toothed opening at one or both ends. Some wrenches have a number of jaws for different sizes of bolts and screws; some, like the *alligator,* or *bulldog,* wrench, have a flaring jaw with teeth on one side; others, like the *monkey wrench,* have a sliding inner jaw adjusted by a screw.




FOUR FORMS OF WRENCHES

(*a*) Machinist's wrench; (*b*) flat pocket wrench; (*c*) alligator wrench; (*d*) monkey wrench.

**WRESTLING,** *res'ling.* Many athletic sports are likely to exercise one set of muscles at the expense of others, but of wrestling and swimming it may be said that they "play no favorites." They bring every muscle into play, from the crown of the head to the soles of the feet, and are therefore among the most healthful of sports. In wrestling it is not always the strongest and heaviest man who wins. Weight counts, naturally, but skill counts also, and a wrestler who has mastered all the difficult holds that may be used—the half-Nelson, the hammerlock, the grapevine lock, and so on—stands a very good chance of throwing a much heavier and stronger opponent who has less skill. In no game, moreover, are the quick eye and the decisive action more essential. The slow wrestler is always the ineffective wrestler; he wastes strength which should be concentrated in the sharp attack and the unexpected stratagem.

The Japanese have a similar sport called *jujutsu* (see that heading, page 3181).

**Catch-as-Catch-Can Style.** Boys on the playground are likely to use this method of wrestling. It is the favorite form in the United States even for exhibition bouts; its popularity may be explained, perhaps, by the fact that it is a very free style, allowing a great deal of liberty to the opponents, encouraging and rewarding strategy and permitting every legitimate kind of artifice. Tripping is permitted, but of course kicking and throttling holds are barred. As the name sufficiently indicates, the holds in this style are taken at random, and the wrestlers struggle to throw each other to the mat or floor. When one of them succeeds in pinning his opponent's two shoulders to the floor, he wins a fall. When the match is professional, two falls in three, or three in five, are usually required for a decision.

**Collar and Elbow.** This style was popular until about 1880; it is recognized as the national style of Ireland. The wrestlers wear a short coat or jacket, with stout collar and sleeves, to obtain a good grip. Each man seizes the collar of his opponent with his right hand and with the other hand takes a firm hold on the sleeve near the elbow. During the struggle neither grip must be relaxed, on pain of losing. A man is thrown when two shoulders and one hip or two hips and one shoulder touch the mat.

**Graeco-Roman.** The name of this kind of wrestling is misleading; it was really developed in France, and has less in common with the sport practiced so skilfully by Greek and Roman athletes than has catch-as-catch-can. In Graeco-Roman wrestling, the contestants are stripped to the waist. They are not permitted to seize each other anywhere below the belt, nor are they allowed to trip each other. Most of the struggle takes place on the mat, and a fall is scored when one of the contestants forces the two shoulders of his opponent to the ground. Bulk and endurance count greatly in this style.

**In Antiquity.** Wrestling is a sport so natural to the competitive spirit of man that one might suppose it to be very old. Such is the fact. There is hardly a feint or artifice known to the modern wrestler that was not practiced by Greek and Roman athletes before the birth of Christ. The Greeks insisted upon grace quite as much as upon strength in their games; the rules governing wrestling were so stringent that Plutarch tells us that no other contests made greater demands on the participants. G.B.D.

Consult Cann's *Manual of Wrestling.*

**WRIGHT,** *rite,* CARROLL DAVIDSON (1840-1909), an American economist, educator and statistician, born at Dunbarton, N. H. He was educated in the public schools of his native town and was preparing himself to be a lawyer when the War of Secession began. Wright enlisted as a private, and was promoted to the rank of colonel in 1864. He was head of the Massachusetts bureau of labor statistics from 1873 to 1885 and United States Commissioner of Labor from 1885 to 1897. In 1900 he became professor of statistics and social economics in George Washington University, and after 1902 was president of Clark College, Worcester, Mass. He was a prolific writer on economic and sociological subjects, especially those relating to labor troubles, and while seldom offering solutions for these vexing problems, gathered most valuable data for consideration. Among his most important books are *The Factory System of the United States, The Industrial Evolution of the United States, Battles of Labor* and *Outlines of Practical Sociology.*

**WRIGHT,** HAROLD BELL (1872- ), an American novelist, born at Rome, N. Y. He was educated at Hiram College, Ohio, and for several years worked as a decorator and landscape painter. Between 1897 and 1908 he preached in various churches of the Christian Disciples denomination. His novels are very popular with those who enjoy sentimental stories written with an expressed moral purpose, and though they have no special literary value they have sold to the extent of millions of copies. His works include *That Printer of Udell's, The Shepherd of the Hills, The Calling of Dan Matthews, The Winning of Barbara Worth, Their Yesterdays* and *Hidden Things.*

**WRIGHT,** ORVILLE (1871- ), and WILBUR (1867-1912), two brothers who, by their perfection of the aëroplane, have won a place in the history of modern civilization. Every important principle of modern aviation was introduced in their biplane, and machines modeled after its pattern are used in every great nation.

Orville was born in Dayton, Ohio, and Wilbur in Millville, Ind., and their education was obtained in the public schools. They were sons of a bishop, himself an inventor, and grew up in a mentally-stimulating atmosphere. In 1896 the young men began their study of aëronautics, but did not allow these interests to interfere with the work in their bicycle shop in Dayton. Both men were reserved and modest and seldom spoke of their ambitions and plans, and consequently received little encouragement (see page 2236).

After 1903 they devoted themselves chiefly to the perfection of their flying machine, which, including motors, they had fashioned with their own hands. They made their early tests at Kitty Hawk, N. C., and in 1905 a successful long-distance flight was made near Dayton. In spite of this achievement they were misunderstood and unappreciated by their townspeople until after their success abroad. In 1908 Wilbur made his first public flight in France, winning a membership in the Legion of Honor and homage from all Europe; Orville won similar recognition by flights in America. The following year the brothers were awarded gold medals by the French Academy of Science, and their machine was accepted by the United States government for use in the army. See FLYING MACHINE.

**WRIT,** *rit.* While in the present people say *written,* the early English people said *writ,* and they also called anything in writing a writ. In this same sense we still speak of the Bible as Holy Writ, but as a rule the word *writ* is now confined to the written orders of a court of law. For instance, if the court commands the sheriff to seize property which some one has wrongfully taken, the sheriff is given a *writ of replevin.* Similarly, a *writ of habeas corpus* commands the sheriff to release a prisoner.

**Related Subjects.** The following writs are treated specifically in these volumes:

| | |
|---|---|
| Attachment | Mandamus |
| Habeas Corpus | Replevin |
| Injunction | Subpoena |

**WRITING,** *rite'ing.* It is on record that soon after the Pilgrims settled in Plymouth an Indian chief sent Governor Bradford a snake skin filled with arrows to inform him that the Indians challenged the Pilgrims to war. Bradford filled the snake skin with powder and bullets and sent it back with instructions to throw it into the fire. The explosion so terrified the Indians that war was avoided. The snake skin and its contents were used as symbols of thought, and in each case they conveyed a message. Later it was discovered that the Indians sometimes sent messages by using pieces of bark on which rude pictures were carved, each picture being the symbol of an idea, as an arrow for an enemy, a triangle for a tent, and so on.

As far back as it is possible to discover evidences of the existence of men on the earth we also find evidence that they used some means for recording their deeds and thoughts. Writing in some form is nearly as old as the human race. Picture writing is the earliest form discovered, and was used by all primitive people. Gradually the pictures came to be used for symbols; then two or more were combined, and in this way the meaning of the symbol was extended. This sort of picture writing reached its highest state of perfection among the Egyptians, who engraved their monuments with designs to which the term *hieroglyphic* was given.

From the combination of pictures into symbols, writing passed to the stage in which it is now used, that in which the symbols represent sounds, and a combination of these symbols form words. All the symbols used to represent the sounds of a language constitute the alphabet of that language. Writing in which symbols represent sounds is called phonetic. The Phoenicians are given credit for inventing the first phonetic alphabet. Between the phonetic alphabet of the Phoenicians and the hieroglyphics of the Egyptians we find the wedge-like writing of the Babylonians and other nations of the East. Antiquarian scholars have been able to translate these inscriptions and to glean from them many interesting facts relating to the ancient peoples by whom they were made. W.F.R.

The development of the letters of our alphabet is given in the articles describing the respective letters (see A, B, etc.). Directions for learning the art of writing are given under PENMANSHIP. Reference is also directed to the following related subjects:

| | |
|---|---|
| Alphabet | Hieroglyphics |
| Cuneiform Inscriptions | Phonetics |

**WRITS OF ASSISTANCE,** *rits, a sis'tans.* In order to enforce the collection of import duties in the American colonies and to seize goods upon which no duty had been paid, the customs officials were provided with general search warrants called *writs of assistance.* These differed from the ordinary search warrant, which authorizes the seizure of only specified goods in a specified time and at a specified place, in not limiting the time or naming the premises in which the officers were authorized to search for suspected goods.

In 1761 James Otis resigned his position as advocate-general of Massachusetts to oppose in court the issuance of new writs of assistance. From a technical standpoint their issuance was legal; therefore Otis boldly denounced Parliament, stating that the use of the writs was legalized tyranny. The writs were granted by the court, and in 1767 were declared legal by an act of Parliament, but because of the strong sentiment against them and the radical feeling of the colonists to which Otis gave voice, they were rarely used. See REVOLUTIONARY WAR IN AMERICA.

**WRYNECK,** *ri'nek,* a small bird of the Old World, related to the woodpeckers, but differing from the latter in having soft tail feathers and being unable to climb. It seeks its food on the ground, securing ants and other insects by quick darts of its wormlike tongue. It nests in natural cavities in trees, for it does not chisel out a nest in the wood. The eggs are glossy white in color and seven to twelve in number. The wryneck is named from its habit of thrusting its head and neck out of its nest when disturbed, with an undulating movement. As it makes a hissing sound at the same time, it is also appropriately called the *snakebird.*

THE WRYNECK

**WÜRTTEMBERG,** *vür'tem berK,* one of the four kingdoms of Germany (see page 2473), is

situated in the southwestern part of the country, between Bavaria and Baden. It had an area of 7,534 square miles and a population of 2,437,574 in 1910. About one-fifth of Lake Constance, on the south, belongs to Württem-

LOCATION MAP

berg. The surface of the country is generally mountainous, and most of the soil is fertile, producing grain, beets, potatoes, hops, tobacco, flax and hemp; fruit trees flourish everywhere, and excellent wines are produced from its thriving vineyards. The Black Forest, in the southwest, provides vast quantities of timber, and iron and salt are its most important minerals.

Württemberg contains a famous seat of learning, the University of Tübingen; the Stuttgart Conservatory of Music also enjoys a world-wide reputation. It is the principal publishing center in the southern part of the Empire. Textiles, dyes, gold, silver and metal wares, surgical and optical instruments are extensively manufactured, and there are large breweries, brickyards and sugar refineries in the industrial centers. Stuttgart (which see) is the capital.

**WÜRZBURG,** *vürtz'boorK,* an ancient university city of Germany, beautifully situated on both banks of the Main, seventy miles southeast of Frankfort. It is the capital of Lower Franconia, a province of Bavaria. The Episcopal Palace, dating from 1722, is one of the most magnificent royal residences in Germany; among its interesting apartments are the Mirror Room, with paintings in Chinese style on the reverse of mirrors, and the Gobelin Room, hung with valuable tapestries. In conjunction with the university, founded in 1582, is the well-equipped Julius Hospital, with a medical faculty of high repute. The university, as well as the hospital, was founded by Bishop Julius, in whose honor a fine statue has been erected. Of the numerous churches, the most noteworthy is the richly-decorated cathedral, containing numerous altars, tombs, statues and sculptures; the Neumünster Church, with the tomb of the poet Walther von der Vogelweide; and the Marien-kapelle, a beautiful monument of fourteenth-century German art, with many tombs and statues. The important industries include the manufacture of surgical and scientific instruments, machinery, tobacco, etc.; there are several large distilleries, and beer is extensively brewed. Population in 1910, 84,496.

**WU TING-FANG,** *woo ting fahng'* (1842- ), Chinese diplomat and statesman, three times China's diplomatic representative in the United States. He was born at Singapore, educated at Saint Paul's College in Hong-kong, and for the law at Lincoln's Inn, London. For a time he practiced law in Hong-kong, but his abilities attracted the attention of the government and in 1882 he was made a member of the official staff of Li Hung Chang, Grand Chancellor of the Empire. He was one of the peace commissioners who negotiated the treaty of Shimonoseki, at the close of the Chinese-Japanese War, and he held several important offices before his appointment in 1896 as minister to the United States. During his ministry the Chinese Exclusion Act was reënacted, and this measure he vainly opposed.

In 1902 Wu Ting-Fang was recalled to China to assist in making commercial treaties with various foreign powers, and for several years concerned himself chiefly with the reorganization of the penal system of his country. From 1908 to 1909 he was again minister to the United States, and in 1912 returned to that country for a year as representative of the new republic.

**WYANDOTTE,** *wi'an dot.* See HURON.

**WYANDOTTE,** MICH., a manufacturing city in Wayne County, in the southeastern part of the state, important as a center for chemical manufactures. It is situated on the Detroit River, twelve miles southwest of Detroit, twenty-three miles northeast of Monroe and forty-seven miles northeast of Toledo, Ohio. Transportation is provided by the Lake Shore & Michigan Southern, the Michigan Central, the Detroit, Toledo & Ironton and the Detroit & Toledo Shore Line. Electric lines extend north and south from the city. The place was settled in 1854 by Major John Biddle, and was named for the Wyandotte tribe of Indians. It was made a village in the same year, was incorporated as a city in 1867 and it adopted the

commission plan of government in 1911. Germans comprise about one-fourth of the population, which increased from 8,287 in 1910 to 9,609 in 1916 (Federal estimate).

Along the western bank of the river, at a depth of about 1,800 feet beneath the city, lies a bed of rock salt estimated to be from 200 to 300 feet thick. It is the principal resource of the leading industrial plants of the city, which make soda ash, caustic soda, bicarbonate of soda and concentrated lye. About two miles south of Wyandotte there are large quarries of limestone, which is combined with salt in making alkalies, but these quarries are owned by a Detroit alkali manufacturing company, and the limestone used in Wyandotte comes from Alpena. About 3,100 people are employed in this industry here. There are also extensive salt works, boat-building yards, fur-rug and coat factories, and manufactories of chemical dyestuffs, motor trucks, trunks and bags. Wyandotte has a city hospital and an $18,000 Carnegie Library, constructed in 1914. C.H.M.

**WYANDOTTE CAVE,** a picturesque natural cavern situated in the vast limestone region of the Ohio River, five miles northeast of Leavenworth, Ind., in Crawford County. Its remarkable stalactite formations excel in beauty and number those of Mammoth Cave, the only larger cave in America. The twenty-three miles of underground passages and large chambers which have been explored in the Wyandotte are noted for such wonders as the Monument Mountain, a collection of stalagmites 175 feet high, standing on the floor of Mammoth Hall, which is 350 feet long and 245 feet high, and the beautiful Pillared Palace, with varied clusters of stalactites hanging from its ceiling.

**WYCLIFFE,** or **WICLIF,** *wik'lif,* JOHN (about 1320-1384), an English reformer, popularly called the "Morning Star of the Reformation," and the first man to begin a systematic translation of the entire Bible into English, was born probably near Richmond, in Yorkshire. After studying at Oxford and becoming master of Balliol College about 1360, he held several rectories, followed by a wardenship of Canterbury. Much of his early life is clouded in uncertainty, but it is known that his fame was early established in university circles.

Wycliffe won royal favor, and appeared as a supporter of the anti-Papal policies advocated chiefly by John of Gaunt. In 1374 he was named on a commission dispatched to Bruges to investigate certain Papal systems and settle with the representatives of Pope Gregory XI disputed points of ecclesiastical authority. Soon after his return to England he made a definite attack on the established order of the Church, its corruption and the follies of its clergy, claiming that the Church had a right to refuse to pay the tribute demanded by the Pope. Because of the ecclesiastical abuses regarding the right of property, Wycliffe sustained the superior power of civil authority.

**Opposed the Church.** More and more definitely his ideas began to take form, and by 1375 he developed the thought which became the guiding principle of all his acts: that each individual Christian may claim immediate dependence upon God, without intervention of clergy, each individual having the right to take the Bible and reason as the foundations of his belief. In 1377 Pope Gregory XI issued five bulls against him because of his alleged heretical opinions. England, however, did not sanction this external authority, and Wycliffe was allowed to go free, enjoying the protection of the government he aimed to sustain. In two treatises, *De Dominio Divino* and *De Civili Dominio,* he set forth his views, emphasizing individual rights and the needs for separating religious and temporal power. Gradually he became attracted to doctrines which bear a marked resemblance to those later sustained by Martin Luther.

**Version of the Bible.** With the peasants' revolt of 1381 he seemed to realize the importance of directing his appeals to the common people, and at this time also felt the need of giving the Bible to the people in their common tongue. He set about to make a systematic translation of the Vulgate version into the English of their everyday life, but it is doubtful that Wycliffe himself did a large part of the actual work of translation. The importance of this task cannot be overestimated. It set the standard of English prose, and gave the people direct access to the very source from which all religious ideas had been received. "Poor priests," as they were called, were sent out on foot, under conditions similar to those of the Apostles of old, to tell the people directly the message of the Bible, chiefly as they had heard it from the lips of their master, Wycliffe himself. Here was the teaching of Christianity directed to practical, everyday life, and its influence for good was far-reaching. His fundamental work was the practical application of his principles to the many evils that existed in his day.

The assertion is made, without substantial support, that in 1382 Wycliffe was summoned to appear before the Blackfriars' Council at Oxford, known as the "earthquake council," and was there condemned because of his teachings. It is uncertain if Pope Urban VI summoned him to Rome in 1384, as he is said to have done; at least, Wycliffe never went to Rome. He died of a paralytic stroke, and was buried at Lutterworth. In 1415 the Council of Constance decreed that his remains be burned; this decree was carried out in 1428, by command of Pope Martin V, and the ashes of the great leader were scattered upon the waters of the River Swift.

His influence extended chiefly through John Huss to Martin Luther and other reformers of the Continent. Most of his writings were in Latin, but in addition to the translation of the Bible the following English collections are extant: *Three Treatises of John Wycliffe, Select English Works of Wyclif,* and *The English Works of Wyclif,* collected respectively by Todd, T. Arnold and F. D. Matthew.

Consult Trevelyan's *England in the Age of Wycliffe;* the English translation of Loserth's *Huss und Wiclif.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Huss, John | Reformation |
| Luther, Martin | Vulgate |

**WYOMING,** *wi o' ming,* a state of the Rocky Mountains region, popularly known as the EQUALITY STATE because it has always extended the privilege of suffrage to men and women on equal terms. Its name is derived from an Indian word meaning *great plains,* referring to the broad, high plains lying between the mountain ranges of the state. Wyoming has rich resources, but owing to the lack of facilities for transportation and the small population its development has fallen far short of its possibilities.

**Size and Location.** The state lies between Montana and Colorado, in the broadest part of the Rockies. In shape it is a rectangle, its boundaries following the meridians of longitude and parallels of latitude. Having an area of 97,914 square miles, of which 320 square miles are water surface, it ranks eighth in size among the states of the Union. Its area is almost twice as great as that of New York and about three and one-half times that of New Brunswick.

**The People.** Although there are only seven states in the Union having a larger area than Wyoming, there is but one—Nevada—which has fewer inhabitants. In 1910 the population was 145,965; this showed a gain of 57.7 per cent over the census figures of 1900. The number of inhabitants per square mile was 1.5, an average smaller than that of any other state except Nevada, but twice as great as the average density of that state. On January 1, 1917, the population, according to a Federal estimate, had increased to 182,264.

Over sixteen per cent of the inhabitants are foreigners, Austrians, English, Germans, Swedes, Italians, Greeks, Scotch and Canadians being the most numerous. There are about 600 negroes and over 900 Japanese and Chinese, who are chiefly employed as laborers in the mines. The Indian reservations cover 950 square miles, and in 1915 the Indian population was 1,829.

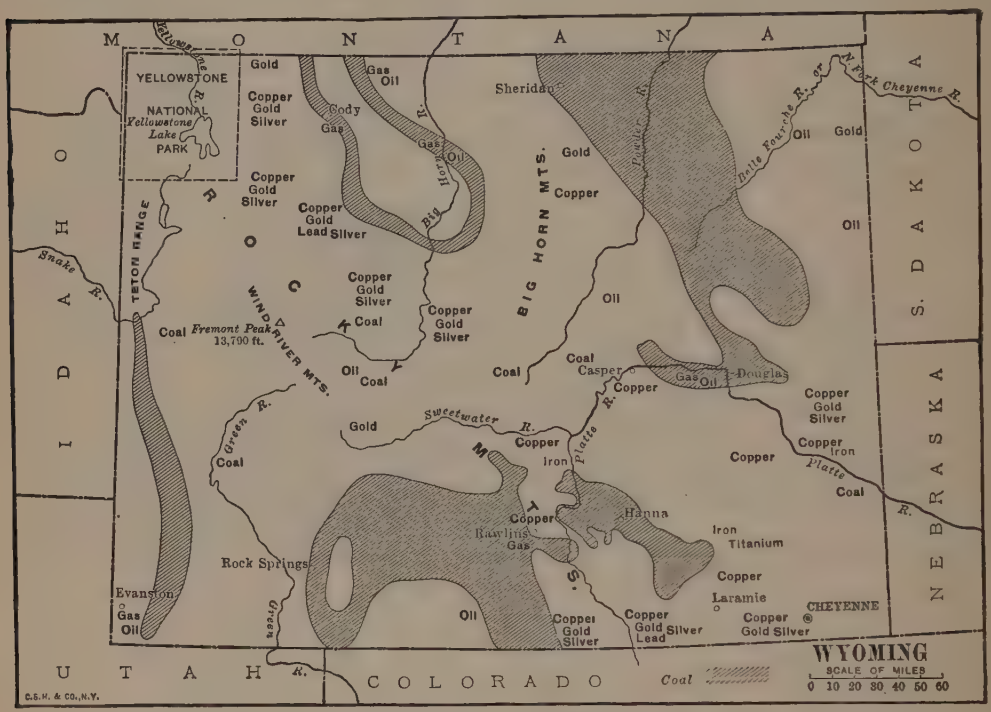
About thirty per cent of the inhabitants live in incorporated cities and towns, only three of which have a population of over 5,000. Sheri-

dan is the largest city; Cheyenne, the capital, is second in rank. Other important towns are Rock Springs, Laramie, Casper, Rawlins and Evanston.

The Roman Catholics are the strongest religious body, and the Latter-Day Saints, who have spread into the state from Utah, have a large number of adherents. Other denominations, ranking in order of importance, are the Methodists, Episcopalians, Presbyterians and Lutherans.

poses. Wherever as many as five pupils can attend, schools have been established, and free textbooks are provided by the state. High schools and the normal school and university at Laramie are supported by the state. Indian schools have been established by the government, and there are facilities for educating Indian boys and girls.

**Institutions.** A state board of charity and correction controls a hospital for the insane at Evanston; a school for defectives at Lander;




OUTLINE MAP OF WYOMING

Showing boundaries, chief rivers, principal cities, mining centers, the location of Yellowstone National Park (which extends into Montana and Idaho), and the highest point of land in the state.

**Education.** The problem of establishing a school system covering large regions so sparsely settled has presented difficulties, but it has been effectively met, as is shown by the small per cent of illiteracy, which averaged 3.3 per cent in 1910 and only 1.6 per cent in 1915. There is a compulsory-education law requiring all children between the ages of six and twelve years to attend school twelve weeks each year. The system is administered by the state superintendent of education, the city superintendents at Cheyenne, Laramie and Rock Springs, and by the county superintendents.

The school fund is derived in part from the rental of public lands reserved for school purposes. Wherever as many as five pupils can attend, schools have been established, and free textbooks are provided by the state. High schools and the normal school and university at Laramie are supported by the state. Indian schools have been established by the government, and there are facilities for educating Indian boys and girls.

**Institutions.** A state board of charity and correction controls a hospital for the insane at Evanston; a school for defectives at Lander; an industrial school at Warland; general hospitals at Sheridan, Rock Springs and Casper; a soldiers' and sailors' home at Buffalo; Big-horn Hot Springs Reservation at Thermopolis, and the penitentiary at Rawlins.

**The Land.** The state occupies a lofty plateau, 5,000 to 7,000 feet above the sea, and as a whole it lies at a higher altitude than any other state. It is divided into several vast, treeless plains by detached mountain ranges rising 3,000 to 6,000 feet above the table-land. The largest mountain masses are in the northwest and southeast corners of the state. The magnificent Shoshone, Teton, Gros Ventre, Snow, Snake River and Owl Creek mountains

form the group in the northwest, in the midst of which lie Yellowstone Lake and Yellowstone National Park. This region of scenic grandeur, with its snowy peaks, waterfalls and great forests, is described in detail in the article YELLOWSTONE NATIONAL PARK.

The Medicine Bow, Laramie, Seminole, Rattlesnake, Sheep and Snow ranges form the southeastern group; the Black Hills enter the northeastern section from South Dakota; the Bighorn Mountains extend into the central part of the state from the north, and the Salt River Range lies on the west. The loftiest mountain is Fremont Peak, whose snow-crowned summit rises to a height of 13,790 feet. It is in the Wind River Range, a detached spur extending from northwest to southeast across the western part of the state.

The Great Divide enters the south-central part of the state and forms a broad pass between the Northern and Southern Rockies, through which lay the route of the old Oregon Trail. The Red Desert, an arid region in whose salty soil only greasewood and salt sage will grow, lies near the southern boundary.

**Rivers and Lakes.** Many of the head streams of three great river systems of the United States—the Mississippi, the Columbia and the Colorado—rise in the lofty mountains of Wyoming. The northern part of the state is drained into the Missouri River by the Yellowstone and its branches, the Bighorn and the Powder rivers. The North Platte, fed by the Laramie and the Sweetwater rivers, and the Cheyenne and the Little Missouri, all of which drain the eastern part of the state, are other rivers of the Mississippi system.

The western and northwestern sections are drained principally by the Snake River, which rises in Shoshone Lake and cuts through the Teton and Salt River mountains in a magnificent canyon. The Green River, the principal head stream of the Colorado, flows through the southwest corner of the state. These streams have carved splendid canyons in the mountains, and they descend over rocky precipices in magnificent cascades.

The largest of the beautiful mountain lakes are Yellowstone, Jackson and Shoshone, all in the northwestern ranges. They are surrounded by forested precipices, and reflect in their clear waters the snow-capped summits of the mountain walls.

**Climate.** The dry and sunny climate of Wyoming is healthful and pleasant. The periods of intense cold and heat which exist in January and July are not so keenly felt, owing to the low humidity. The extreme temperatures recorded are 116° above and 44° below zero. However, these extremes are unusual; the highest temperature generally does not exceed 100°, and the lowest is rarely more than 30° below zero.

The snowfall is light, and with an annual rainfall averaging but thirteen inches, Wyoming is one of the most arid states in the Union. Although the mountain snows and springs feed many streams and support forests, irrigation is necessary in all localities except along the river banks.

**Agriculture.** The larger part of the great elevated plains, which are covered with nutritive grasses, is occupied by sheep ranches and cattle ranges. Owing to this abundance of natural pasture land, the raising of live stock is the most important branch of agricultural industry. In 1916 the total value of the live stock in the state exceeded $66,250,000, more than half of which was in cattle. Horses of hardy stock are raised in great numbers, and in sheep raising Wyoming is one of the leading states. The total number of sheep reported in 1916 was 4,338,000, valued at $24,293,000. Poultry raising is growing in importance; between the census reports of 1900 and 1910 the poultry holdings increased 221 per cent in value.

The extension of irrigation has caused considerable growth in the stock-raising industry as well as in farming, since ninety per cent of the hay and forage acreage is irrigated land. Ditches have been dug in all sections where water is available, and they extend long distances from the sources of supply. In this way immense tracts have been converted into tillable land. Including works completed and under way, the Shoshone project waters an area of 149,360 acres.

Only a little more than one-eighth of the land area is in farms, and only about two per cent of the total area is improved farm land. Unreserved lands cover over 30,929,000 acres, an area exceeded in only two other states—Nevada and Utah. The most important crops are hay and forage, chiefly alfalfa and wild grasses, oats, wheat, potatoes, vegetables, rye and barley. Corn is grown in sheltered and well-irrigated sections. Apples and small fruits are important crops, and plums, prunes and cherries are successfully grown.

**Forests.** Up to the timber line the mountains are covered with coniferous (cone-bearing) trees. On the mountains east and south

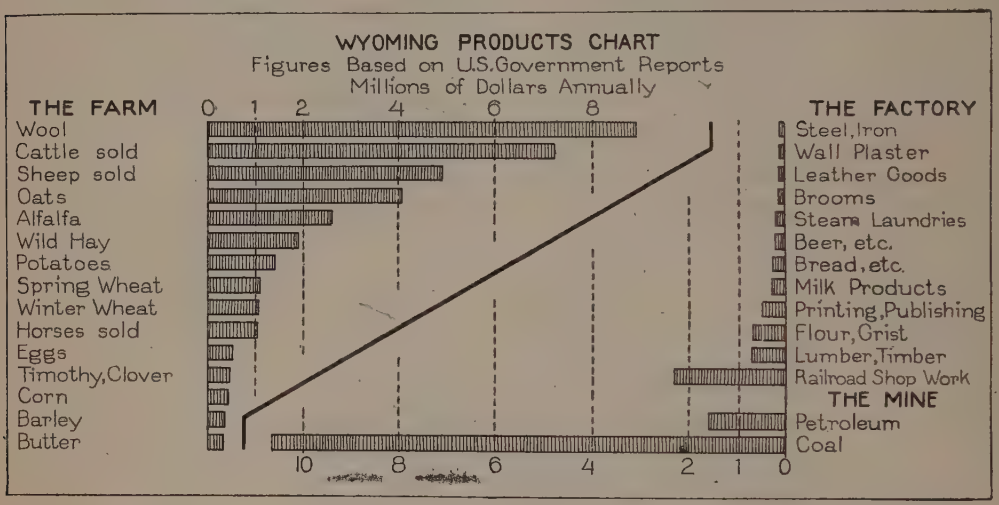
of Yellowstone Park there are great forests of lodge-pole pine; the forests of the Bighorn Mountains and the Black Hills produce yellow pine, and the Medicine Bow slopes yield the Douglas fir and Rocky Mountains white pine. Juniper, willow, ash, scrub oak and wild plum and cherry trees grow in the foothills, but occasional cottonwoods along the streams are the only trees of the plains.

**Minerals.** The development of Wyoming's great mineral wealth has been retarded by the lack of railroads. With increased facilities for transportation, mining is likely to prove the prime factor in the growth of the state. Although gold, silver and other valuable minerals are found in the mountains, mining has been limited principally to the production of coal. In 1915 the output was 6,268,989 tons, the value of which constituted almost five-sixths of the income from all mineral products. The coal fields are in the southwestern part of the state, and the available supply is enormous. Wyoming usually ranks twelfth among the states in the production of coal.

Petroleum is next in importance among the mineral products of the state. The oil industry has shown remarkable growth, and Wyoming is now among the ten leading oil-producing states in the Union. Ninety-six per cent of the output comes from the Salt Creek and Shannon fields, in Natrona County. Field work has been especially active; 104 wells were dug in 1916; an important new field was opened in Hot Springs County.

Iron ore is mined in the southeastern slopes of the Laramie Mountains, and is the third mineral product in point of importance. The output has decreased since 1913, and the state has fallen from sixth to eighth rank in iron production. Gypsum, copper, building stone, sand and gravel, mineral waters and gold and silver are produced in small quantities. A few gems and precious stones, and phosphate, graphite and asphaltum deposits are found.

**Manufactures.** Although the abundance of fuel, the rich minerals and the live-stock products constitute a broad basis for the development of large industries, there has been little growth of the manufacturing interests. The value of the state's manufactures is only about $3,000,000 a year. The most important industries are the construction of cars and general repair work for the railroads, the manufacture of lumber and timber products, the milling of flour and grist, printing and publishing and the making of butter, condensed milk and cheese.

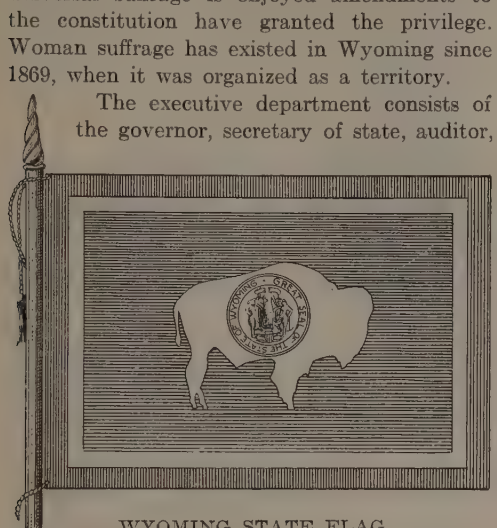



**Transportation.** Wyoming has no navigable rivers, and proportionately less railroad mileage than any other state. In 1917 there were less than 2,100 miles of railroad in the state, and the only means of communication with the towns of the central and west-central sections was by stagecoach over rough and mountainous roads. The southern part of the state is traversed by the Union Pacific line, and the Chicago, Burlington & Quincy extends across the northeastern corner. A spur of the Chicago & North Western enters the state, and a branch of the Northern Pacific extends from Montana to Yellowstone Park.

The limited railway mileage is due to the mountainous character of the state.

## *Government and History*

**Government.** The constitution of Wyoming is unique in being the only state constitution which granted suffrage to both sexes from the beginning of statehood. In other states where universal suffrage is enjoyed amendments to the constitution have granted the privilege. Woman suffrage has existed in Wyoming since 1869, when it was organized as a territory.



WYOMING STATE FLAG

Adopted in 1917. The large rectangular area is blue, as is also the seal. The outer border is red. The parts shown unshaded are white.

The executive department consists of the governor, secretary of state, auditor, treasurer and superintendent of public instruction, all of whom are elected for four years.

The legislature consists of a senate of twenty-eight members, elected for four-year terms, and a house of representatives of fifty-six members, elected for two years.

The judicial department consists of a supreme court with a chief justice and two associate judges, and inferior courts (in counties) established by the legislature. Capital punishment was abolished in 1915, and in the same year a law was passed providing that judges be nonpartisan.

Workmen's compensation laws, accident laws, child-labor laws and mothers' pension acts have been passed, and in 1915 a public service commission, consisting of the governor, state treasurer and auditor, was created.

**History.** Probably the first white man to enter the territory of the present state was Chevalier de la Verendrye, a French fur trader and explorer, who passed through the region in 1743. In 1807 John Colter, an American trader, discovered the Yellowstone region; it became a meeting place of the early trappers, and is described in Washington Irving's story, *Captain Bonneville,* the hero of which is one of the traders. No permanent settlement was made until 1834, when Fort Williams, later called Fort Laramie, was established as a trading post.

That section of the present state lying east of the Rockies was a part of the Louisiana Purchase. It was included in the territory of Missouri in 1812, and in the "Indian Country," organized in 1834. It was later part of the territories of Nebraska and Dakota. The region west of the mountains was successively included in the Oregon country and the territories of Oregon and Washington. That part of the state south of the forty-second parallel belonged to Spain, then to Mexico, and lastly to the republic of Texas, before it was ceded to the United States. In 1863 the government was again changed, when all of the region now in the state except a small section in the southwest was given to Idaho territory, and the following year was transferred to Dakota.

The streams of immigration to California and Oregon passed through Wyoming, but few of the pioneers settled in the state. The Northern Sioux and Cheyenne Indians in possession of much of the region were hostile to white settlement, and continued their outbreaks and attacks until after the close of the Sioux War in 1876.

The extension of the Union Pacific Railroad through Wyoming, in 1866, brought an influx of settlers, and in 1868, with its present boundaries, Wyoming was organized as a territory. In 1890 it entered the Union as a state. That the people are more progressive than in some of the states to the east is shown by recent laws, referred to above.

**Other Items of Interest.** Wyoming has two soda lakes, which have a combined area of almost half a square mile. The soda crystallizes during the summer months in heavy crusts, and is cut like ice into blocks three or four feet thick. Another crust soon takes the place of the one that is cut away.

This state is often called, by reason of its scenic beauties, the "wonderland of America."

In 1893 specimens of iron ore from the Hartville district in Wyoming were exhibited at the World's Columbian Exposition in competition with ore from all parts of the world, and were awarded the Grand Prize.

Cloud Peak, in the Bighorn Mountains, has several small glaciers.

At Thermopolis and Saratoga are to be found springs with temperatures of about 135°.

# WYOMING

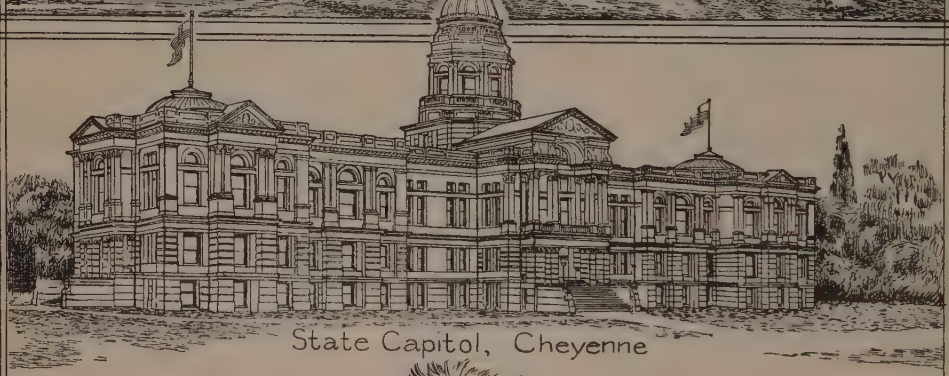
1910 1.5
1900 0.9
1890 0.6
1880 0.2

People per Square Mile by Decades

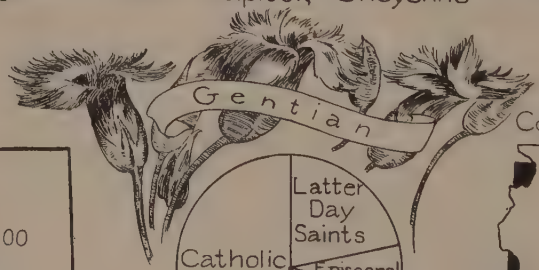
Yellowstone Falls

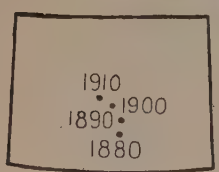
Yellowstone National Park

Sheep Raising



State Capitol, Cheyenne

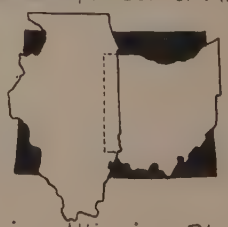



Center of Population

Religions

Comparison of Area



Wyoming - Illinois + Ohio (nearly)

## *Research Questions on Wyoming*

**(An Outline suitable for Wyoming will be found with the article "State.")**

What does the name Wyoming mean? Why is the name well suited to the region?

What is the popular name of the state? What legislative enactment gave it the right to this title?

What is the state flower? (See FLOWERS, subtitle *State Flowers.*)

Describe this flower.

How many states of the Union are larger than Wyoming? How many states have a larger population?

How many states with a smaller area have a larger population?

How does Wyoming compare in population with the state which it most closely resembles in area?

If the United States as a whole had the same number of inhabitants to the square mile as Wyoming has, what would the population of the country be?

If the smallest state in the Union were as sparsely populated, how many inhabitants would it have?

Who was the first white man to visit this region?

In what work of literature was a part of this region described?

How does Wyoming rank among the states as to average altitude?

How does its greatest elevation compare in altitude with the loftiest point in each of the bordering states?

Upon how many states does Wyoming border? How does it compare in area with each of these?

What is the most beautiful scenic region of the state? Describe some of its picturesque features.

What is a "divide," in the scientific sense? (See DIVIDE.) Where does the Great Divide of the Continent occur in Wyoming?

What three great river systems of the country receive waters from the melting snows of Wyoming's mountains?

Why are the extremes of heat and cold not felt so keenly as they would be in a coastal state?

What is the extreme range of temperature that has been recorded in the state?

What is the most important branch of agriculture? How do you account for its great development?

What part of the total area is in farm land? In improved farm land?

What is the area of the forest reserves outside of Yellowstone National Park?

What trees grow on the mountains? On the foothills? On the plains?

Why have not the mineral resources been developed to a greater extent?

How many states produce more coal? What is known as to the probable extent of the coal measures?

What interesting fact bears testimony to the excellent quality of the iron ore of Wyoming?

How does the state compare with other states in the relation of railway mileage to area?

What reason can you see for the lack of transportation facilities?

In the southwestern part of the state is a region from which no streams flow outward. All of the drainage is into desert lakes, where the sand swallows up the water.

Wyoming was one of the regions formerly frequented by vast herds of buffalo, or bison, but to-day the only survivors are those which roam the preserves in Yellowstone Park.

Yellowstone Park is not the only national reservation in the state. Forest reserves with a total of 5,207 square miles have been set aside in the Bighorn Mountains and the Medicine Bow Mountains.

Captain B. L. E. Bonneville, the hero of Irving's *Captain Bonneville,* was the first man to cross the Rocky Mountains with wagons.

Among the interesting features of the Black Hills region of Wyoming is the so-called Devil's Tower, an elevation curiously carved by erosion.

In 1885 the rainbow trout was introduced into Wyoming rivers from California, and it has become one of the best game fish of the state. In the Big Laramie River eight- and ten-pound specimens are caught. E.B.P.

Consult Hebard's *The Government of Wyoming;* Peterson's *Men of Wyoming.*

**Related Subjects.** The reader who is interested in Wyoming may consult the following articles in these volumes:

CITIES

Cheyenne — Sheridan
Laramie

LEADING PRODUCTS

Cattle — Sheep
Petroleum — Wool

PHYSICAL FEATURES

Bighorn River — Yellowstone National Park
Black Hills
Rocky Mountains — Yellowstone River
Snake River

**WYOMING,** UNIVERSITY OF, a state institution at Laramie, founded in 1886. It is organized into the colleges of liberal arts, agriculture, engineering and education, the departments of commerce, home economics, music and university extension, a teachers' training high school and a summer school. The state normal school is maintained as a department of the college of education, and the Wyoming Agricultural Experiment Station is operated in connection with the work in agriculture. Though the university is at the head of the educational system of the state having the smallest population except one (Nevada), it has an enrollment of about 575 and a faculty of seventy-five. The library has 39,000 volumes.

**WYOMING VALLEY MASSACRE,** *mas'a ker.* When the Revolutionary War broke out, Wyoming Valley, in the present Luzerne County, Pa., was a chartered town of Connecticut and proved itself a stanch supporter of the colonial cause. The few residents with British sympathies, called Tories, were driven out, and most of the men joined the Continental army. The Tories, however, joining themselves to a band of other Tories and Indian allies, marched upon the Valley in the summer of 1778. The inhabitants immediately took refuge in Forty Fort, which was near the present city of Wilkes-Barre; there were but 400 men among them, while the invaders numbered 1,100, of whom 700 were Indians. On July 3 there occurred a battle in which the settlers were utterly defeated, almost two-thirds of them being killed during the conflict or tortured to death afterward by the Indians. The remainder retreated to the fort, which capitulated the next day. The settlers were then allowed to find their way to nearest settlements, many of the women dying of the hardships they were forced to endure on the way. The beautiful valley was devastated and the villages were laid waste. The event was a sad chapter in the war. See Revolutionary War in America; Tory.

MASSACRE MONUMENT
Erected at Wilkes-Barre to commemorate the deeds in Wyoming Valley in 1778.

**WYSS,** *vees,* Johann Rudolf (1781-1830), a Swiss educator and author, remembered chiefly for his entertaining story *The Swiss Family Robinson.* It relates the adventures of a family which was shipwrecked on an island in the Pacific Ocean, and is the best of several stories written in imitation of Defoe's *Robinson Crusoe.* Wyss was born in Bern, Switzerland, where he became professor of philosophy and held the post of librarian. He also wrote the Swiss national hymn, *Rufst du, mein Vaterland?*

**WYTHE,** George (1726-1806), one of the signers of the Declaration of Independence, and a member of the Constitutional Convention. He was born in Virginia and was educated at William and Mary College. From the outbreak of the Revolution he was actively devoted to the patriot cause, and in 1775 sat in the Continental Congress. After the war he served as judge of the Virginia high court of chancery, and was for ten years professor of law at William and Mary College.

# Xx

**X** is the twenty-fourth letter of the English alphabet. The Phoenician alphabet, from which, through the Latin, most of the English has come, had no sound which corresponded to the English *X;* but it had a consonant with a somewhat sibilant, s-like sound, which bore the form shown in the illustration. This form, according to investigators, was a rough sketch of a post or pillar, and the Phoenician name for the letter was *samech,* which meant *support.* The Greeks took over the letter, in modified form, and the Romans adopted it in its *ks* sound, which is its common sound in the English. In any of its values *x* is unnecessary in English, for it can be represented either by *ks,* as in *fix,* or by *gs,* as in *existence.* As an initial letter it has the sound of *z,* as in *Xerxes.*

As a numeral, *X* stands for ten. In algebra, *x* is the most common symbol for an unknown quantity.

**XANTHIPPE,** *zan thip'e,* or **XANTIPPE,** *zan tip'e,* the wife of Socrates. Tradition declares her to have been shrewish in temper, and some accounts state that Socrates married her simply to discipline himself and acquire self-control. To many of these stories, however, there is no foundation, and attempts have been made to prove that the entire conception of her character is a mistake. It is certain that she suffered greatly at her husband's imprisonment and death. See SOCRATES.

**XAVIER,** *zav'i er* (in Spanish, *hah vyair'*), FRANCISCO DE (1506-1552), a Jesuit missionary best known as SAINT FRANCIS XAVIER, and also called the "Apostle of the Indies." He was born near Sanguesa, of noble family, studied in Paris, and there made the acquaintance of Ignatius of Loyola, whom he helped to found the Order of Jesuits, or Society of Jesus. Accompanying Ignatius to Italy, he did hospital and missionary work, and in 1537 was ordained a priest, remaining in Rome until 1540 as secretary of the Jesuit society.

In the next year he was sent by John III of Portugal to spread Christianity in the Portuguese possessions in India, and he landed in Goa in 1542. In Goa, in Travancore, at Malacca and even in Japan he preached the doctrines of the Church, and everywhere made many converts, baptizing thousands in Japan. He then planned a mission to China, but died before he could set out upon it. In his own day miracles of all sorts were ascribed to him, and he was credited with possessing the gift of tongues, which he himself expressly denied, however. That he was one of the greatest Christian missionaries of all times cannot be doubted, for the number of his converts mounted to scores and even hundreds of thousands, and he was, moreover, an efficient organizer. He was canonized in 1622.

Consult Bartoli's *Life of Saint Francis;* Joly's *History of the Society of Jesus.*

**Related Subjects.** The reader may consult in this connection articles on the following topics in these volumes:

Jesuits
Loyola, Saint Ignatius of
Missions and Missionaries

**XENIA,** *ze'ni a,* OHIO, a city and the county seat of Greene County, situated in the southwestern part of the state, fifty-five miles southwest of Columbus, the state capital, and sixty-five miles northeast of Cincinnati. It is on the Little Miami River, and is served by the Cincinnati, Hamilton & Dayton and the Pitts-

burgh, Cincinnati, Chicago & Saint Louis railroads, and by interurban lines. In 1910 the population was 8,706; in 1916 it was 8,710 (Federal estimate). Prominent features of the city are the Federal building, completed in 1914 at a cost of $160,000, and a Carnegie Library, the city hall and the county courthouse. The city is the seat of Xenia Theological Seminary (United Presbyterian), and has the Ohio Soldiers' and Sailors' Orphans' Home. Just outside of the city are the county infirmary and children's home; at Wilberforce, three miles distant, is Wilberforce University, a school for colored students. Xenia manufactures rope, twine, shoes, fuses, powder, rubber, canned goods and candy. The place was settled in 1804, was incorporated as a town four years later, and became a city in 1832. In the vicinity are interesting relics of Indian mound building. E.L.B.

**XENOPHON,** *zen'o fon,* an Athenian historian and soldier, who was born about 430 B.C. and died not earlier than 355 B.C. He was a pupil of Socrates, but the excitement of a soldier's life appealed to him more than philosophy, and in 401 B.C. he joined the expedition of Cyrus the Younger against Artaxerxes of Persia. In the Battle of Cunaxa Cyrus was killed, and shortly thereafter the satrap Tissaphernes put the Greek generals to death. Ten thousand Greek mercenaries were thus left in a strange country, without a leader; but they chose Xenophon for that post, and set out on their march toward home. After innumerable hardships they reached the Bosporus, and there they joined a Spartan army which was on its way to do battle against Tissaphernes.

Xenophon was fortunate during this expedition, for he received as ransom money for a wealthy Persian whom he had captured enough to make him independent for the rest of his life. Returning to Greece he fought with the Spartans against Athens, and was therefore banished from his native city. Later the decree of banishment was recalled, but he never again made Athens his home. The most famous of Xenophon's writings are the *Anabasis,* an account of the expedition of Cyrus and the retreat of the ten thousand Greeks; the *Hellenica,* a history of the last part of the Peloponnesian War, intended as a sequel to the history of Thucydides; the *Memorabilia,* or recollections of Socrates, and the *Symposium,* a discussion of an imaginary banquet at which Socrates was supposed to have taken part. Xenophon's style is clear and forceful, but sometimes almost monotonous; his work is painstaking and accurate.

Consult Wright's *Short History of Greek Literature.*

**XERXES,** *zurk'zeez,* the name of three kings of Persia, the most illustrious of whom was Xerxes I, one of the greatest warriors of ancient times.

**Xerxes I** was the son of Darius I and of Atossa, daughter of Cyrus the Great. After his accession to the throne in 485 B.C. he suppressed the revolt in Egypt, and thereupon set out to conquer Greece; he would thus avenge the humiliations of his father, who had undertaken the same task with the purpose of punishing the Greeks for their part in the Ionian rebellion and the victory of Marathon. In Cappadocia he collected a vast army, said to have numbered a million men, from all parts of his empire, and set out with an immense fleet furnished by the Phoenicians. He threw two bridges, formed by a double line of boats, across the Hellespont and cut a canal through Mount Athos. Arriving at Sardis in the autumn of 481 B.C., he remained there for some time, and then ordered his army on its march across the Hellespont. Seven days and nights were spent in making the passage, owing to the vast numbers in his army, which required 1,207 ships-of-war, attended by 3,000 smaller vessels.

At first Xerxes was victorious—at Artemisium, Athens and Thermopylae—and he did not rest content until he had ravaged all the houses and temples of Athens. The tremendous fleet was crushed at the Battle of Salamis, in 480 B.C., and with no further communication by sea with Asia, Xerxes fled to Sardis. Mardonius, his ablest general, was left in control of the army, which was routed at Plataea the following year. Xerxes then undertook to destroy the temples of the city of Babylon, and aimed to circumnavigate Africa. Instead he yielded to indifference and debauchery, and was finally murdered by Artabanus, a captain of the guards. He was succeeded by his son, Artaxerxes I.

**Xerxes II** was the son of Artaxerxes I, and lived approximately between the years 450 and 425 B.C. When his parents were murdered he ascended the throne, but was assassinated after a forty-five days' rule. The name of Xerxes was also given to Oarses, who ruled about 337 B.C.

**Related Subjects.** The following articles in these volumes will explain the references in the above discussion:

Cyrus the Great
Darius, subhead *Darius I*
Greece, subhead *The Period of Glory*
Hellespont
Persia, subtitle *History and Government*
Persian Wars
Salamis
Thermopylae

**XIMENES,** *zim'e neez,* FRANCISCO (1436-1517), a celebrated Spanish churchman and statesman. He was born at Torrelaguna, in Castile, studied at Alcalá and in Rome, and was appointed to the priesthood of Uceda, near his birthplace. The archbishop of Toledo resisted the appointment, however, and kept Ximenes in prison for six years on the charge that his personal orders had been resisted. He gained the favor of Cardinal Mendoza, afterward archbishop of Toledo, and when the confessor of Queen Isabella of Castile died in 1492, Mendoza recommended Ximenes to the post, he being then a member of the Franciscan Order. So well did he please the queen that on the death of Mendoza in 1495 she insisted on his accepting the archbishopric of Toledo, contrary to his own wishes. Until the queen died in 1504 Ximenes was her chief adviser, and after her death he was regent whenever Ferdinand was absent.

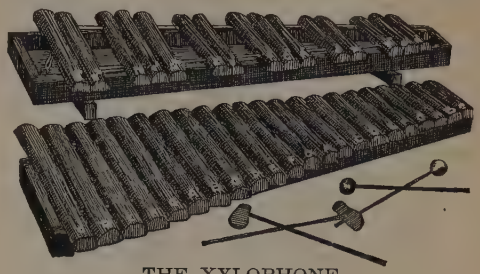
He was made cardinal in 1507, and as grand inquisitor was chiefly responsible for the wide employment of the Inquisition (which see) as a political force in Spain. His greatest service to Spain consisted in breaking down the almost royal power of the great feudal nobles. He endowed the University of Alcalá, and promoted learning in other ways.

**XINGÚ,** *sheeN goo',* a river of Brazil which is one of the large tributaries of the Amazon. Its sources are in the watershed between the Amazon and the Paraguay, in the state of Matto Grosso. It flows in a northerly direction and enters the Amazon about 240 miles above Pará. Its length is about 1,200 miles. The channel contains numerous rapids and falls, which make navigation impracticable.

**X-RAY.** See ROENTGEN RAYS.

**XYLOPHONE,** *zi'lo fohn,* a musical instrument composed of sticks of wood selected for their sounding quality and graduated so as to sound the chromatic scale. These bars of wood are placed on a stand; the performer plays by striking with wooden mallets, one being held in each hand.

**X Y Z CORRESPONDENCE,** the name given to the reports sent to the United States in 1797 by its three ambassadors to France, Charles Cotesworth Pinckney, John Marshall and Elbridge Gerry. At that time France was guilty of the same offenses for which the United States later went to war with England, but which had been temporarily adjusted by treaty. The French had seized cargoes on American ships and had impressed American seamen,



THE XYLOPHONE

forcing them to serve on French ships. The Directory, then governing France, was furious over the settlement that the United States had just made with England, and over the defeat of Jefferson, a French sympathizer, in the Presidential election, and announced that it would receive no minister from the United States.

The United States could not let such an insult pass unnoticed, but so great were the dangers of a war to the little republic at that time that President Adams decided to send three ambassadors to adjust matters. Prince Talleyrand, the French foreign minister, refused to deal with them except through three agents, who insulted the Americans with dishonorable proposals, even demanding from them "a great deal of money for the pockets of the Directory." The story has come down that Pinckney replied to the hint for a bribe with the words, "We have millions for defense, but not one cent for tribute."

President Adams laid the official reports of these proposals before Congress, concealing only the names of Talleyrand's agents, whom he called X, Y and Z. In his message to Congress Adams declared: "I will never send another minister to France without assurance that he will be received, respected and honored as the representative of a great, free, powerful and independent nation."

No formal declaration of war was made by the United States, but a Navy Department was created, measures were taken to raise an army, which Washington was invited to command, and American privateers were authorized to attack French vessels. All the American sympathizers with France were silenced by the exposure of Talleyrand's intrigue, and it was also very unfavorably received in France.

THE WORLD BOOK
ORGANIZED KNOWLEDGE IN STORY AND PICTURE
TRADE MARK REGISTERED

# Yy

**Y** is the twenty-fifth letter of the English alphabet, and is used both as a consonant and as a vowel. The Greeks added to the Phoenician alphabet when they adopted it a character which was sometimes made like a capital *V*, sometimes like a *Y*, and which represented the *oo* sound. Gradually the *Y* form of the letter became established as the correct one, and the sound changed to that of the German *ü*, a sound not found in the English language. The Romans adopted the letter for use in Greek words, and from them it came into the English alphabet, where by degrees it acquired its present value.

Like *w*, *y* has a vowel as well as a consonant use, but, unlike *w*, it is frequently used by itself as a vowel, as in such words as *try, pretty*. As a vowel it has all the sounds of *i* except that in *machine;* and since it possesses no other sounds, is really superfluous. As a consonant there is no other letter which could exactly take its place, though even in such words as *yellow* the initial sound closely resembles that of the short *i* in *it*, slighted in pronunciation.

The character *y* is occasionally seen in such expressions as "ye olden time;" here it is not properly a *y* but a survival of the old English *thorn*, which has passed out of use. It should be pronounced as *th*. See T.

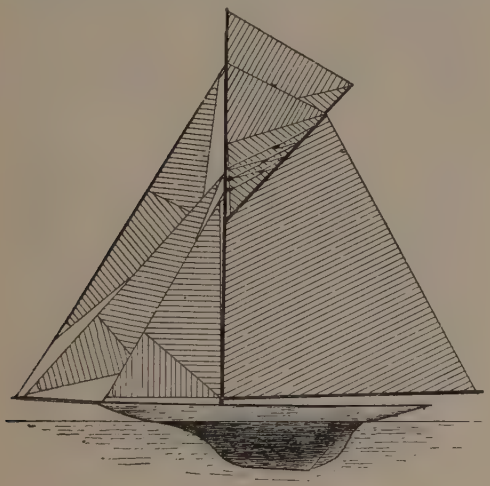
**Y**, or in Dutch IJ, an arm of the Zuider Zee, which juts westward into the Netherlands. Amsterdam is situated on its southern shore. Like much of the coastal region of the Netherlands, it is being drained and reclaimed, and what was formerly a great arm of the sea is to-day largely agricultural land. A deepened channel of the old Y through the center of this reclaimed section forms part of the North Sea Canal, which connects the Zuider Zee with the North Sea.

**YABLONOI,** *yab lo noi'*, **MOUNTAINS,** a partially unexplored range of mountains in Siberia, extending from the northern part of Mongolia in a northeastern direction for about 1,000 miles, when they join the Stanovoi system. The range forms a dividing line between the rivers which flow into the Arctic Ocean and those that flow into the Pacific. The highest peak attains an altitude of 8,000 feet, and there are many with heights of 5,000 and 6,000 feet. The whole system forms part of the northeastern border of the plateau lands of Central Asia. See map, opposite page 417.

**YACHT AND YACHTING,** *yot, yot'ing.* Boats equipped with sails and used for pleasure are known as *yachts.* There are three important rigs for these boats—*cutter, schooner* and *yawl.* A cutter generally carries four sails—mainsail, gaff-topsail, foresail and jib—and has one mast and a running bowsprit. A schooner is equipped with two masts—mainmast and foremast—and a standing bowsprit and jib boom, though in some cases these latter are replaced by a running bowsprit. A yawl has the same rigging as a cutter, besides a small mizzenmast. (The principles upon which sailing is based and rules for managing such boats are given under the heading SAILBOAT AND SAILING.)

Steam yachts, and especially gasoline-driven vessels, which have a high rate of speed, are coming rapidly into use. They are especially favored by business men who desire quick transportation between their country homes and the business centers. The fastest boats of the largest class use turbine engines, and many of them burn oil instead of coal.

Yachting is an exhilarating sport that has become of national importance in the United States, Canada and England. International races between the United States and England began in 1851, when the *America* won, by a race around the Isle of Wight, a five-hundred-dollar silver cup offered by the English Royal Yacht Squadron. The trophy has since then been a possession of the New York Yacht Club, though several English yachts have endeavored to win it back. The waters off Sandy Hook are usually the scene of these exciting races, which never fail to arouse great interest and enthusiasm on both sides of the Atlantic. Among the later American boats that successfully defended the cup were the *Volunteer,* the *Defender,* the *Vigilant* and the *Reliance.* Sir



MODEL OF RACING YACHT

Thomas Lipton's *Shamrock III* was defeated by the *Reliance* in 1903. In 1914 Sir Thomas sent his *Shamrock IV* to America to race for the trophy, but the outbreak of the great war put an end to all plans. B.M.W.

Consult Skene's *Elements of Yacht Design.*

**YAFA,** *yah'fah.* See JAFFA.

**YAK,** the name given to the wild ox of Tibet. It is distinguished by its coat of long, silky hair, which covers the body and hangs in a thick fringe along its sides. Sometimes, on an old animal, this fringe is so long that it reaches the ground. The tail, too, is very long and bushy. Apparently this hair was developed as a protection against the cold, for it forms a thick mat which protects the animal's body from the bed of snow on which he rests.

There are two distinct species. One is the magnificent wild yak of the highest and coldest parts of the plateau of Tibet; the other is the smaller, domesticated yak, which supplies the natives of the country with food, clothing, shelter and a means of travel. The wild yak,

THE DOMESTICATED YAK

standing nearly six feet high at the shoulder, is black in color, with a thick body, short legs and strong horns; it somewhat resembles the North American bison, or buffalo. While it is by nature very shy and wary, when aroused it is a formidable foe.

The domestic yak, called the "grunting ox," is smaller, and is often mottled black and white in color. It is not used for plowing, as is the domestic ox, but is of great value as a beast of burden, for Tibet is without railroads. The milk it yields is very rich and furnishes excellent butter, which the natives use to make their coarse food more palatable. Tent coverings and ropes, woolen cloth and woolen garments are made from the yaks' long hair. The bushy tails, dyed red, form an important article of trade with India, where they are used to drive away flies.

**YAK'IMA,** meaning *runaway,* the name of an important Shahaptian tribe of North American Indians, who formerly lived on both sides of the Columbia and on the northerly branches of the Yakima and the Wenatchee rivers, in Washington. A treaty was made with the Yakimas by the United States government in 1855, by which the Yakima Reservation in Eastern Washington was established. Thirteen tribes, besides the Yakimas, were to be confederated as the Yakima Nation upon the reservation, but before the treaty could be ratified an Indian war broke out which involved them. It was not until 1859 that the provisions of the treaty were carried into effect.

It is now impossible to estimate the number of Yakimas proper, as the term has been used to include all the tribes within the limits of the reservation. Of the total population living on the reservation in 1917, estimated at 1,900, very

few are true Yakimas. Originally the Yakimas were active fishers, hunters and traders.

**YALE,** ELIHU (1648-1721), an English philanthropist, one of the first patrons of Yale University, was born near Boston, where his parents, natives of Wales, were living temporarily. At the age of three the boy returned with his parents to London and was educated there in private schools. He became an agent for the East India Company of London, and rose rapidly in this service until in 1687 he was appointed governor of the important station at Fort Saint George, at Madras. He returned to London in 1692 with a large fortune acquired through private trade, and was considered so influential in commercial circles that in 1699 he was chosen governor of the East India Company.

At that time he began to give liberally to educational and religious institutions, among them the Collegiate School, founded in 1700 at Saybrook, Conn. Between 1715 and 1721 he presented its trustees with money and property amounting to £900, or nearly $4,500 in American money. In 1718 the school was removed to New Haven, Conn., and his name applied to its building, and in 1745 was formally given the name of Yale College. Yale spent his last days in North Wales, and was buried there in the famous church at Wrexham. His gifts to the American school were given more through a desire to aid the efforts of New England clergy in educating young men for the ministry than through any hope that a great institution of learning should ultimately result; but his donation, small as it may seem in this day, was the foundation for one of the largest present-day universities in the world.

**YALE UNIVERSITY,** one of the largest and most influential universities in the United States, located at New Haven, Conn. Though it was established more than sixty years after the founding of Harvard, the oldest American college, the first New Haven settlers (1638) hoped from the beginning of their settlement to found a college in their town. It was only because Massachusetts asked that their support be given to the newly-founded Harvard College that the New Haven colonists agreed to wait for a more auspicious time.

An examination of the roster of Yale graduates shows that this institution has taken its part in shaping the history of the United States by training leaders in many fields of activity. Nathan Hale, the Revolutionary hero, was a member of the class of 1773. Four signers of the Declaration of Independence and three members of the Constitutional Convention were Yale men. In theology Yale furnished Jonathan Edwards and Timothy Dwight. The temperance and antislavery leader, Lyman Beecher, was a Yale graduate, and so, too, were James Kent, the famous jurist; John C. Calhoun, Vice-President of the United States; Eli Whitney, inventor of the cotton gin; Samuel F. B. Morse, inventor of the telegraph; Noah Webster, Donald G. Mitchell and Edmund Clarence Stedman, of literary fame; and William H. Taft, twenty-seventh President of the United States.

**Development of Yale.** The movement which resulted definitely in the founding of the institution dates from 1701, when ten of the principal clergymen of Connecticut Colony donated a collection of books for a college. Later in the year the colonial legislature passed an act to permit the erection of a "Collegiate School wherein youth might be instructed in the arts and sciences and be fitted for public employment both in church and civil state." An organization was then perfected, and the school was established at Saybrook. In 1716 it was permanently located in New Haven. The name Yale College was adopted in 1718, in honor of Elihu Yale, who had made generous donations to the school. At commencement time in that year a wooden building, on the site of the present Osborn Hall, was formally dedicated.

In 1795 Timothy Dwight became president, and the college entered upon a period of prosperity. There were then about a hundred students and a faculty consisting of the president, one professor and three tutors. President Dwight enlarged the campus, established permanent professorships and planned the organization of professional schools under special faculties, but he lived to see only the establishment of the school of medicine. Under Jeremiah Day's administration, beginning in 1817, schools of law and theology were organized, and when President Day resigned, in 1846, the student enrolment had increased to 587. Under President Theodore D. Woolsey (1846-1871) the college advanced in standards of scholarship and in number of instructors, the scientific school and the school of fine arts were established, and plans were laid for graduate work. The student enrolment increased to 809.

Under President Noah Porter (1871-1886) the elective system was adopted. The college experienced great prosperity during this adminis-

tration, and the number of students increased to 1,079. In 1887, the year President Timothy Dwight (grandson of the former President Dwight) succeeded to the presidency, the state legislature authorized the institution to change its name to Yale University. At the conclusion of President Dwight's term, in 1899, Yale had a student body of 2,500. Within the next few years, under the progressive administration of Arthur Twining Hadley, the productive funds showed a great increase; many new buildings were erected, and the institution continued to maintain its place among the American universities of first rank. In 1916 the number of students was officially reported to be 3,254 and the number of instructors 478. There were 1,000,000 volumes in the library. Yale is strictly a university for men, and its student enrolment was affected by the entrance of America into the War of the Nations, in 1917, for large numbers of students enlisted in various branches of the service.

**Organization.** The corporation of Yale University comprises the president, the trustees, the governor and lieutenant-governor of Connecticut (made members *ex officio* in 1792) and six graduate students elected from their own number. There are nine departments of study, each under the supervision of a special faculty. They are as follows:

The *College,* the nucleus about which the other departments developed, which offers academic courses leading to the degree of Bachelor of Arts.

The *Sheffield Scientific School,* which gives instruction in the mathematical, physical and natural sciences, and is both a graduate and an undergraduate school.

The *Graduate School,* formally organized in 1847, and conferring the degrees of Doctor of Philosophy and Master of Arts.

The *Medical School,* the first professional school organized at Yale.

The *School of Religion,* formerly Congregational, but now undenominational.

The *School of Law,* with a three-year course of study, leading to the degree of Doctor of Laws.

A graduate course leading to the degrees of M. L. or Jur. D. or D.C.L. is also offered.

The *School of Fine Arts,* offering courses in drawing, painting, sculpture and architecture, supplemented by lecture courses on related subjects.

The *School of Music,* giving instruction to prospective teachers, composers and musical critics.

The *School of Forestry,* a graduate department founded in 1900, with courses leading to the degree of Master of Forestry. The School Forest (1,000 acres) is at Keene, N. H.

**Notable Structures.** Besides its library buildings, laboratories, recitation halls and dormitories, Yale University has several structures of special interest. On Prospect Street, about a mile from the college campus, are the buildings of the Observatory, one of the best equipped in the country. There is a $200,000 gymnasium building, and connected with it are the Carnegie swimming tank, indoor baseball grounds and a running track. One of the structures of which the students are justly proud is the great Yale "Bowl," a football amphitheater having the seat slabs placed directly upon the earth. It is really a vast excavation, with the sides sloping from a center depth of twenty-seven feet below ground level. The "Bowl" can accommodate fully 60,000 spectators, who find their seats through thirty tunnels. B.M.W.

Consult Slosson's *Great American Universities;* Stokes' *Memorials of Eminent Yale Men.*

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Dwight, Timothy | Hadley, Arthur Twining |
| Elective Studies | Yale, Elihu |

**YALU,** *yah'loo,* a Korean river whose source is in the highest peak of the Shan-a-lin Mountains of Manchuria. When Japan annexed Korea and named it Chosen, the name of the Yalu was changed to the Oryoku (*o'rio'ku*). Flowing southwest and south, it forms most of the boundary between Korea and Manchuria, and after a course of 300 miles empties into Korea Bay. Seagoing vessels can ascend the river thirty miles; smaller boats can reach 145 miles inland. In 1894 it was the scene of a Chinese-Japanese navel battle, and during the Russo-Japanese War there was considerable fighting on its banks. See Russo-Japanese War; Chosen.

**YAM,** the name given to a plant whose edible roots somewhat resemble the sweet potato. It grows in the warmer regions all over the world, but is especially to be found in China and the South Sea islands, in Australia and in the southern parts of North America. The plant itself has long, slender, climbing stems, and bears small, green flowers in clusters. The roots vary greatly in size and shape, from those which are much like an ordinary sweet potato to the large specimens of China and Australia, which grow to be more than three feet long and weigh over thirty pounds.

In China, where one-twentieth of an acre may be the total estate of a land owner, where three acres for one family is considered very comfortable and ten acres means luxury, a trench from ten to fifteen feet long can be made to produce enough yams to supply one

man a year. The yam the Chinese raise is a native of India and not of China. Besides the yam raised for food, the Chinese grow another variety called a dye yam, from which they obtain the tan and dark brown color for dyeing their coarse cotton cloth and their fishing nets. In Australia the yam is the only plant cultivated by the natives, and it furnishes the bulk of their food. The natives dig the huge roots out of the ground with primitive tools called yam sticks, which are three-foot stakes broadened and sharpened at one end. The edible yam contains less starch than the Irish potato, but has more nitrogen matter and more sugar. Usually it has an acrid taste, which disappears when it is baked, boiled or roasted.

THE AMERICAN YAM

**YANCEY,** *yan'si,* WILLIAM LOWNDES (1814-1863), "the orator of secession," born near the Falls of the Ogeechee, Ga. At the age of twenty he began the practice of law in Greenville, S. C., at the same time editing a newspaper which strongly opposed nullification. After two years he removed to Alabama, where he was destined to become the leading political figure of the period before the War of Secession. Three years in the state legislature were followed by two years (1844-1846) in Congress. Yancey had by that time, however, changed his political views and had become convinced that compromise between the North and the South was impossible. He resigned from Congress and henceforth preached the doctrine of no compromise.

He drew up an Alabama political platform protesting against the doctrine of squatter sovereignty, and when the Democratic national convention of 1848 refused to accept its principles he opposed in fervent speeches Lewis Cass, the Democratic candidate for President. He bitterly fought the Compromise of 1850 and tried zealously to secure the secession of Alabama; but the time was not yet ripe. The results of squatter sovereignty, which had been disappointing to the South, soon turned public sentiment toward Yancey's view. In the Democratic national convention of 1860, at Charleston, Yancey appeared as the acknowledged leader and spokesman of the Southern delegates. His attitude was already clear from his action in 1858, when he urged the organization of committees of safety to "fire the Southern heart, instruct the Southern mind, give confidence to each other, and at the proper moment, by an organized, concerted action, precipitate the Cotton states into revolution." When the convention refused to accept his views on the slavery question, Yancey withdrew, followed by the delegates from eight of the Southern states. He seems to have felt that even a united Democratic party could not prevent the election of a Republican President, and his withdrawal from the convention was intended not to disrupt the Democratic party but to stand as a flaming warning to the South.

In the campaign that followed, he delivered many speeches throughout the North, ostensibly to urge the election of Stephen A. Douglas, but really to present to the North a defense of the South. Later he refused office in the Confederate Cabinet of President Davis, but accepted an appointment as one of three commissioners to secure European recognition of the independence of the Confederacy. While he was absent in Europe, Alabama chose him as one of its representatives in the Confederate Senate. As a Senator he frequently criticized the Confederate government as inefficient, and demanded a more vigorous prosecution of the war.

In the history of the United States Yancey is one of the few public men whose influence and importance cannot be measured by the offices they have held. Except for two brief periods Yancey held no office whatever, yet he was responsible, perhaps more than any other one man, for the general belief among Southerners in the right of secession. Right or wrong, he felt that he was a man with a mission. He was a great orator, fiery and inspired; his influence remained long after his actual words were forgotten, and it was through no fault of his that his mission was destined to failure. W.F.Z.

**YANG-TSE-KIANG,** *yahng'tseh ke ahng',* the longest river in China, which has its source in the lofty Tang-la Mountains of Tibet, more than 16,000 feet above the sea. The river flows eastward, southeastward and then south, enters the Chinese province of Yun-nan, and, after winding about in a great double curve, flows across the province of Sze-chuen in a northeasterly direction. It then follows an irregular eastern course through the central

part of China, entering the Yellow Sea over 3,000 miles from its source. This great river has a drainage basin nearly 700,000 square miles in area, for it has numerous tributaries.

Various parts of its course are designated by special names, but foreigners usually speak of the whole river as the Yang-tse-kiang. With its many tributaries it forms a waterway system of vast importance—one of China's three greatest river systems. Large ocean steamers ascend the river to Hankow, 680 miles from the mouth, and smaller boats can go 500 miles farther, to I-chang. About half the sea commerce of China is distributed by means of the Yang-tse-kiang, and the native sailing craft, called *junks,* are found on its waters by thousands. Millions of China's inhabitants dwell on its banks. Among the great cities built on its shores are Nanking, Ching-kiang and Su-chow. The Yang-tse is subject to disastrous floods, which on many occasions have caused great loss of life and property. It frequently rises as high as fifty feet.

**YANKEE,** *yang'ke.* This name, in Europe commonly applied to any inhabitant of the United States, is in its narrower and more correct meaning limited to the people of New England. It first came into general use during the Revolutionary War, when the British soldiers applied it in derision to the New England troops, but there is evidence that it was not unknown before that time. During the War of Secession any Federal soldier was called by the Confederates a Yankee, who in turn called the Confederates "Johnny Rebs."

The derivation of the term remains uncertain though there are two fairly plausible explanations given. One is that the word is akin to the Scotch word *yankie,* which means *shrewd,* and thus agrees with the time-honored conception of New England character; the other and more generally accepted theory is that it was an Indian corruption of the word *English,* or *Anglois.* See YANKEE DOODLE.

**YANKEE DOO'DLE,** an American national song. The tune is very ancient, having been used in the service of the Catholic Church of Italy as early as the tenth century. It was popular with the common people of that time, and it gradually came into use as a melody for a vineyard song in Sicily, Italy and other portions of Southern Europe. Probably as early as 1500 it had reached Holland and was sung there by the harvesters to verses beginning with the meaningless words—

Yanker dudel doodle down.

During Shakespeare's time it was in use in England as a nursery song, and in later days was the air for a doggerel beginning—

Lucy Locket lost her pocket,
Kitty Fisher found it;
Nothing in it, nothing in it
Save the binding round it.

When Cromwell rode down from Canterbury to take charge of the Puritan forces, the Cavaliers composed and sang to the old tune the derisive words—

Yankee Doodle came to town
Upon a Kentish pony,
He stuck a feather in his cap
And called him Macaroni.

The word *macaroni* was a term then applied to London dudes who affected ridiculous Italian styles.

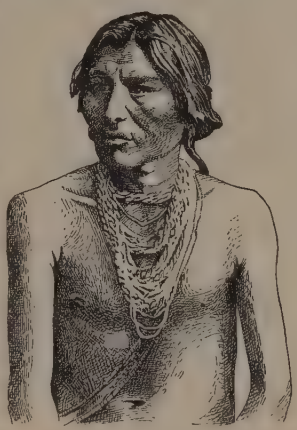
The words of *Yankee Doodle,* as known in America, were written in derision of the untrained American troops during the French and Indian War in 1755 by an English army surgeon, Dr. Richard Schuckburgh. The Continental soldiers accepted the challenge and at once took up the song; by the time of the Revolution it was well known in American homes. The first printed notice of it in America was in the New York *Journal* of October 13, 1768, where it was spoken of as a "capital piece." Throughout the Revolution it was sung and played in every patriot camp, and during Cornwallis's retreat from Concord was whistled and sung so persistently by the Continentals, as they fired from behind trees and walls, that the British general is said to have rushed into his camp with the exclamation, "I hope to God I shall never hear that tune again." He did hear it again, however, under harassing circumstances, for it was played by American bands as the British soldiers marched away after the surrender of Yorktown.

It has been said of the words to *Yankee Doodle* that "they never will suffer from editing, as Shakespeare has, because they could not be worse;" but the tune itself is so lively and catchy that the song will probably never lose its popularity among Americans. E.D.F.

**YANKTON,** *yangk'tun,* S. D., a city and the county seat of Yankton County, is situated on the Missouri River, sixty-five miles southwest of Sioux Falls and sixty-five miles northwest of Sioux City, Iowa. It is served by the Chicago, Milwaukee & Saint Paul, the Great Northern and the Chicago & North Western railroads. The city contains Yankton College (Congregational), a Federal building, completed in 1903

at a cost of $100,000, a Carnegie Library, the State Hospital for the Insane, Sacred Heart Hospital and Forresters' Park. Farming and stock raising are the chief interests of the vicinity, of which Yankton is the trade center. The city industrial plants include flour mills and nurseries, and manufactories of cement and cigars. Yankton was settled in 1862 and was capital of the territory of Dakota until 1883. It became a city in that year, and in 1910 adopted the commission form of government. The population in 1910 was 4,189; the state census of 1915 reported 4,780. H.A.R.

**YAQUI,** *yah'ke,* a North American tribe of Piman stock, representing a well-advanced stage of civilization. They live in villages in the Mexican state of Sonora, and number about 13,000. The Yaquis are an energetic and courageous people. The men in their communities cultivate corn, tobacco, beans and cotton, and the women are skilled weavers; also, in the country about their settlement these Indians are employed in mining, stock raising and other industries. At various times they have revolted against the Mexican government, and in 1900 a large number of women and children were deported to Yucatan.



TYPE OF YAQUI

**YARKAND,** *yahr kahnd',* an important city in Chinese Turkestan, situated in the western part of the country, about 100 miles southeast of Kashgar, at an elevation of 3,850 feet above sea level (see map, *Asia,* opposite page 417). It rivals the city of Kashgar in opulence, and is still an important center of trade with Northern India, though railways have considerably diminished its commercial prestige. The city, which is surrounded by a wall and a moat, is entered by several gates. The houses are mostly one-story huts, built of clay and stone, and the streets are intersected by canals and aqueducts. Interesting features include Fort Yengisher, Mohammedan colleges, bazars and mosques. The inhabitants, largely of Turkish stock, number between 75,000 and 100,000, and are largely engaged in stock raising and in the manufacture of carpets, woolens, silks, linens, cottons and dyes.

**YARMOUTH,** *yahr'muth,* the county town of Yarmouth County, Nova Scotia, at the southwest extremity of the province. It is one of the most important seaports in the Maritime Provinces, has regular steamship connection with Boston, Halifax and Saint John, and is the second largest exporter of lumber in Nova Scotia. It is the terminus of the Dominion Atlantic and the Halifax & Southwestern railways, both of which carry the products of Western Nova Scotia to this shipping point. By rail it is 215 miles southwest of Halifax, and by water it is 240 miles northeast of Boston, which receives the greater part of its trade. Population in 1911, 6,600; in 1916, about 7,000.

Yarmouth's commercial importance is due partly to its great trade in fresh fish and lumber, and also to its trade in its own manufactures. It is a large exporter not only of fresh fish, but also of boned fish, canned lobster, liniment and other fish products. It has a large woodworking factory, a steel shipbuilding and boiler plant, a shoe factory, several foundries and machine shops, and largest of all, a cotton mill which manufactures duck and sailcloth.

In the days of wooden ships, Yarmouth was known as the town which owned more ships, based on population, than any other port in the world. It is now known also as a town of lovely homes and beautiful surroundings. The hawthorn hedges are the pride of the town, and the roads of the vicinity are the delight of automobile tourists. Yarmouth was founded in 1761, and was named for Yarmouth, Mass. It was incorporated as a town in 1890.

**YARMOUTH,** or **GREAT YARMOUTH,** a seaport of Norfolk, England, on the east coast, at the mouth of the Yare. It is the center of the country's herring fisheries, and the curing of the famous Yarmouth bloaters is an industry of importance. Dickens in his *David Copperfield* lets his readers feel, through little David, the salty, fishy air of the place, and the rough charm of its seafaring folk. The town has a fishermen's hospital and a sailors' home, and there are a number of handsome buildings, including the twelfth-century Church of Saint Nicholas. Dominating features of the town are its long quays and the narrow lanes, or "rows," 145 in number, which run at right angles to them. The houses on these straight lanes were once the homes of wealthy tradesmen, but today are inhabited by the poorer classes. During the War of the Nations Yarmouth suffered

from the air raids of the Germans. Population in 1910, 55,905.

**YATES,** Richard (1818-1873), an American statesman, born at Warsaw, Ky., destined to become one of a group of famous "war governors" during the period of the War of Secession. His parents moved to Springfield, Ill., where his childhood was spent. He was educated at Illinois College at Jacksonville, graduating in 1838, and began at once the practice of law in Springfield. Entering politics, he soon became one of the leaders of the state, and was a member of the legislature nearly the entire time from 1842 to 1855.

Yates was one of the founders of the Republican party, and was active in the nomination of Lincoln in 1860. He was governor of Illinois from 1860 to 1865, and none of the other "war governors" served his country more intelligently or with greater zeal. He was elected to the United States Senate in 1865 and served until 1871, covering in his term the period of Reconstruction. His son, Richard (born 1860), was governor of Illinois from 1901 to 1903.

**YAZOO,** *yaz'oo,* an Indian word meaning *river of death,* is the name of a river in Northwestern Mississippi, formed by the junction of the Yalobusha, Tallahatchie and several Mississippi bayous. It winds slowly southwest for 300 miles, flowing into the Mississippi eleven miles from Vicksburg. It is navigable for practically its entire course at all seasons of the year. Yazoo City, a town with various cotton mills and cotton by-products factories, and Greenwood, an important shipping center in the cotton industry, are the principal towns on its banks.

**YEAR,** *yeer,* the period of time measuring a complete revolution of the earth around the sun. The solar equinoctial, or tropical, year, which may be defined as the interval of time between two successive passages of the sun through the vernal equinox, is 365 days, 5 hours, 48 minutes, 46 seconds. As the motion of the earth relative to the equinox determines the changes of seasons, this year is used for all practical and astronomical purposes, and is the basis of the common, or calendar, year. The use of a calendar year of 365 days makes necessary the introduction of an extra day every fourth year to correct the difference between the calendar year and the true year. This fourth year is called *leap year,* and the extra day is February 29. As the addition of a day, however, overcorrects the difference by 44 minutes 56 seconds, leap year is omitted in century years, except those divisible by 400. Thus 1700, 1800 and 1900 only had 365 days, but 2000 will have 366 days. This omission now makes the difference between calendar and true time a matter of only one day in several thousand years.

The sidereal year consists of 365 days, 6 hours, 9 minutes, 9 seconds. This is the time required for the earth to make a complete circle of its orbit. It differs in length from the solar, or tropical, year because of the precession of the equinoxes. The sidereal year is seldom used except for astronomical calculations.

In most Christian nations the calendar year now begins on January 1. The ancient Roman year, before the adoption of the Julian calendar, began on March 1, while the Jewish civil year began at the autumnal equinox. The Church, or sacred, year of the Jews, however, began at the vernal equinox. As the Mohammedan year is a lunar year of 354 days, measured by the periods of the time, the beginning of the year continually falls earlier in the seasons. During the Middle Ages most European nations considered March 1 or March 25 as the first day of the calendar year. By 1600 nearly all civilized countries except England recognized January 1 as the first day. England adopted the Gregorian calendar on January 1, 1752. The Church calendar adopted in the Roman Catholic and most Protestant churches is regulated by the solar and partly by the lunar year, thus causing the distinction between fixed and movable feasts. The fixed feast days are determined by the solar year, the movable feasts by the lunar. W.F.Z.

**Related Subjects.** In connection with this discussion, the reader may consult the following articles in these volumes:

| | |
|---|---|
| Calendar | Precession of the |
| Earth, subhead *Motions* | Equinoxes |
| *of the Earth* | Seasons |
| Epoch | Sidereal Time |
| Equinox | Time |
| Leap Year | |

**YEAST,** *yeest.* The action of bread dough which has been set to "rise" is familiar to almost every one, and even the small child knows that mother puts yeast in the sponge (see below) to get the desired result. The child, however, may not know that the yeast is a mass of tiny, one-celled plants, which are among the simplest forms in the vegetable kingdom. The yeast plant is classed as a fungus (see Fungi). It is produced by the process of fermentation, and multiplies by budding. That

is, a small formation pushes out from the cell wall, and soon the new growth is shut off by a wall of cellulose. It then becomes an independent cell, from which others may grow. Anyone can cause yeast to form by setting aside a mixture of flour, water and sugar and letting it ferment. The process takes about three days, but may be hastened by the addition of a little vinegar.

**How the Yeast Works.** The commercial product may be used in any one of three forms—liquid, dry or compressed. However, compressed yeast cakes wrapped in tin foil enjoy the widest favor at the present time. In the making of bread it is customary to mix the yeast with a small portion of flour and water. This mixture, with the addition of sugar and sometimes potatoes, forms the so-called *sponge*. The sponge is allowed to stand for a few hours —in some cases over night—and is then mixed with more liquid (water, milk, potato water or whey) and flour to make the dough, which, after thorough kneading, is covered and set to "rise." Some housewives prefer a shorter process, and they omit the preparation of the sponge. This is possible only when compressed yeast is used.

The yeast cells at once attack the starch in the flour, which they convert into sugar, and the latter substance is in turn changed into alcohol and carbon dioxide. This change makes the mass light and porous, the familiar bubbles in bread dough being due to the bubbling up of the gas through the mixture. In baking, the alcohol evaporates, and the yeast germs are destroyed, so no taste of these substances remains in properly-made bread. Sour bread results from the presence of acid fermentations in the dough, a condition that sometimes develops when bread is left to "rise" an undue length of time. The principle of fermentation by the use of yeast is also employed in the manufacture of beer.

**How Yeast Is Manufactured.** The yeast plant is of such economic value that the manufacture of yeast for the baking and brewing industries has become itself an industry of importance. Bakers' yeast and beer yeast are not the same, the latter being too bitter for use in bread making, though it is sometimes thus utilized after undergoing a process of purifying and sweetening. Dry yeast, or German yeast, as it is sometimes called, is made by introducing yeast previously obtained into a liquor produced from barley, malt and rye, called wort. When the wort is in a violent state of fermentation the yeast is skimmed off and freed from the liquid by pressure. Compressed yeast is made largely from the top yeast of fermenting lager beer, which is forced to the surface by the escaping carbonic acid gas in the form of a yellow-brown foam. This is skimmed from the fluid, washed and pressed into cakes of a size to be marketed. B.M.W.

**Related Subjects.** Interesting material connected with this subject may be found in the following articles in these volumes:

| | |
|---|---|
| Bacteria and Bacteriology | Cellulose |
| Beer | Chlorophyll |
| Bread | Fermentation |
| Brewing | Fungi |
| Cell | Protoplasm |
| | Spore |


**YEATS,** William Butler (1865- ), an Irish poet and dramatist who became the foremost figure in the so-called Irish Literary Revival. It was not simply the fact that he went for his material to the life and legends of Ireland that gave him this outstanding position; it was rather the possession of a peculiar "Celtic" temperament and genius, which fitted him to express his native country so well.

Yeats was born in Dublin on June 13, 1865, and was the son of J. B. Yeats, an artist of distinction. For a time he studied his father's profession, but before he was twenty-two had turned definitely to literature. The exquisite, elusive character of his poetry was recognized immediately, and the publication of *Cathleen in Hoolihan, The Land of Heart's Desire, The Pot of Broth, The Hour Glass* and other plays proved that his dramatic gifts were not inferior to his lyrical genius. With Lady Gregory he was instrumental in establishing the Irish Literary Theater, out of which grew the Irish National Theater Society, whose players became known throughout America and Western Europe. Yeats made lecture tours in the United States and Canada in 1903 and 1914 and was enthusiastically received. In 1916 he published his *Reveries over Childhood and Youth.*

**YED'O,** Japan. See Tokyo.

**YELLOW,** *yel'o,* one of the three primary colors of the spectrum. With blue it forms green; with red, orange; blue, yellow and red lights mingled give white light. As the apparent color of the sun, yellow is held sacred by some primitive tribes, and it is the national color of China. Strong light increases the intensity of yellow; most colors are dimmed by it. Lemon and canary yellow are considered pure yellow. See color chart, opposite page 1483.

**YELLOWBIRD.** See AMERICAN GOLDFINCH.

**YEL'LOW FE'VER,** a dangerous infectious disease, so called because it causes the skin of its victims to assume a yellow tint. The specific germ which causes it has not been identified, but it is known that it is transmitted by the bite of a mosquito known to scientists as *Stegomyia calopus*. A full account of the experiments which proved the malignancy of this mosquito and the story of the measures adopted to combat it are given in these volumes in the article MOSQUITO, pages 3967-3968.

Yellow fever is a warm-climate malady. It was first recognized as a definite disease in 1647 in the West India Islands, and since that time has been known in West Africa, South America and in Southern United States. American occupation in Cuba and the Canal Zone has driven it out of those regions, and the disease has also been conquered in New Orleans (see page 4180). Wherever the principles of sanitary science have been applied, particularly along the line of exterminating the mosquito, yellow fever has become a thing of the past.

Usually three or four days intervene between the infection and the beginning of an attack. The initial symptoms are frequently weakness, headache and a general feeling of discomfort, but the victim may first have a severe attack of chills. The temperature rises in a few days to 105° or more, and lasts for a period of from three to five days. Severe pains occur in the head, limbs and back. Nausea, vomiting and jaundice (spreading over the entire body) are other symptoms. If the case ends fatally the symptoms increase in violence, and the vomited matter becomes black, indicating the presence of blood in the stomach. Hemorrhages at the nose and mouth are liable to occur, and at this time the victim becomes delirious. Very bad cases sometimes terminate in death a few hours after the patient is stricken. Persons who recover usually begin to improve at the end of the fourth or fifth day, and are well at the end of two or three weeks. Absolute rest in bed during the entire attack is essential. A physician can prescribe measures to take care of the symptoms. C.B.B.

**YEL'LOW-HAM'MER,** one of the thirty-six names of the genial flicker, or golden-winged woodpecker, the largest and most common woodpecker in America. See FLICKER.

The title properly belongs to the *yellow bunting,* one of the most common of the small birds of Great Britain and many parts of the Continent. The name *yellow-hammer* is a corruption of the German *ammer,* meaning *bunting.* The bird has a brilliant plumage of yellow, varied by dark patches of brown, and dusky black wings edged with gold. All the summer its short, sweet songs issue from the hedges and low trees, where the birds build their nests. Their eggs are spotted with red, and because of this the inoffensive little bird has been the victim of much persecution. According to an old tradition, it flew too near the Cross and its plumage was stained with blood. As a punishment, it was said, the eggs were spotted with red. Because of this superstition, the bunting has been scorned in many lands, and its nest has been pillaged and destroyed. The bird is often used as food, and in Italy large numbers are raised for the market.

**YELLOW JACK'ET,** a small species of American wasp, striped black and yellow and notorious for its vicious disposition. It is one of the social wasps and lives in large communities. The nests are built beneath stumps and stones or often in excavations in the open ground. They consist of eight or more horizontal layers of cells, and sometimes contain as many as 15,000 cells. The underground nests are often larger than a half-bushel basket, and are reached by tunnels opening into the center of the nest. The outer, papery covering of the yellow jacket's nest is less firm and tough than that made by the hornets. The life history and habits of the yellow jackets are similar to those of the larger wasps. They feed largely upon the juices of ripe fruit, and cause considerable loss in orchards and market gardens, but compensate for this damage by destroying many grubs and blowflies. See WASP.

YELLOW JACKET AND NEST

**YELLOW JASMINE,** *jas'min.* See GELSEMIUM.

**YELLOWLEGS,** a common American snipe, with black and white markings and long, yellow legs, found along shores and in marshes and easily decoyed by hunters. It nests from the

Northern United States northward, far beyond the Arctic Circle, depositing its three or four eggs, buffy in color, and spotted with brown and lilac, in a depression in the ground. The yellowlegs makes the longest migration flight of

THE YELLOWLEGS
This bird travels about 16,000 miles every year in its migration.

any bird, wintering as far south as Argentina, thus covering a distance of eight thousand miles. Starting from the Yukon region in a fresh, plump condition, it reaches its southern feeding grounds jaded and thin.

**YELLOW RACE.** See RACES OF MEN.

**YELLOW SEA,** an arm of the Pacific Ocean, extending 600 miles inland between China and Chosen, or Korea (see map, *Asia,* opposite page 417). Along the Chinese coast are sand banks, and on the Chosen side there are numerous small islands. At the north the sea forms the Korean, Liao-tung and Pe-chi-li gulfs, and south of Chosen the Korea Strait connects it with the Japan Sea (see location map on page 1364). Its greatest breadth is over 300 miles, and it is nowhere deeper than 300 feet. It receives its name from the muddy, lemon-colored water near shore, due to deposits from the Hoang-ho and the Yang-tse-kiang.

**YEL'LOWSTONE NATIONAL PARK,** one of the world's "wonderlands," is a national park in the northwestern corner of Wyoming, set apart by the United States government in 1872 for "the benefit and enjoyment of the people." It extends a short distance into Idaho on the west and into Montana on the north. The park proper is sixty-two miles long and fifty-four miles wide, and has an area of 3,348 square miles, making it about two-thirds the size of the state of Connecticut. In 1891 a forest reserve lying on the southern and eastern boundaries was created, and the combined area of the two reserves is 5,500 square miles.

**General Description.** Yellowstone Park is a plateau with an average altitude of 8,000 feet. The Absarokas on the east, the Snowy Mountains on the northeast, the Gallatin Range on the north and west, and the Tetons on the south, with their snow-capped summits, form a natural boundary whose beauty and grandeur give an appropriate setting to one of the most marvelous regions in the world. The park is diversified with hills, plains and valleys, and here and there in the park and on the borders mountains rear their summits to heights of 11,000 and 12,000 feet above the sea. Among these is Electric Peak (11,155 feet), the highest mountain wholly within the park. The Grand Teton, beyond the southern boundary, has an altitude of 13,670 feet. The larger streams have cut deep canyons in the rock, where cascades and falls lend interest and beauty to their rushing torrents.

About four-fifths of the park is covered with beautiful forests of lodge-pole pine, balsam, spruce and Douglas fir. The preservation of these forests is essential both to the beauty of the park and to the maintenance of the water supply for the many springs and streams. Some of the broad valleys, like Hayden and Junction, bear rich growths of grass and innumerable wild flowers during the short summer, but in the geyser region a thin layer of silica, known as the *formation,* covers the ground and gives it a light, grayish color. Seen from a distance these basins appear to be covered with snow. Shrubs and occasional trees are found along the margins of streams, but these basins as a whole are practically bare.

**Animal Life.** The park is a game preserve. Hunting is strictly prohibited, and the forests and valleys abound in large game, including elk, deer, antelopes, mountain sheep and buffalo. There are two herds of buffaloes, numbering in all about 400. The long period of protection has removed the fear which most of these animals have for man, and they are seldom disturbed by the approach of visitors. The bears become especially tame during the summer and gather daily about the garbage heaps at the hotels and camps, from which they obtain a good supply of food. They never disturb visitors, and they are a constant source of amusement. Waterfowl frequent the rivers and lakes, and birds and small animals are found in the forests. The lakes and streams abound in fish, and the numbers are

IN YELLOWSTONE NATIONAL PARK.

Great Falls of the Yellowstone, 360 feet high.

kept up by the annual addition of new stock by the United States Fish Commission. Fishing is allowed under government regulations during a part of the year. Brook, lake and Rocky Mountain trout are the varieties caught.

**Wonders of the Park.** No other place in the world of equal area contains as many natural wonders as Yellowstone National Park. Geysers, hot springs, cold and sparkling lakes and rivers, deep gorges, stupendous cataracts and a canyon whose beauty and grandeur are beyond adequate description, are all found within this small area.

*Geysers.* There are five geyser areas or basins in the park. Three of these—the Norris Geyser Basin, the Lower Geyser Basin and the Upper Geyser Basin—are along the route usually taken by tourists. The other basins contain but few geysers, and they are comparatively unimportant. The eruption of a geyser is explained in the article GEYSER, but the grouping of these intermittent fountains of boiling water in certain small areas seems strange to the visitor who has not made a study of volcanic phenomena. These basins are the spots where the heated rocks of the interior cone are nearest the surface. As a distinguished traveler has aptly put it, "They are the trapdoors in a volcanic stage through which the fiery actors in the tragedy of Nature, which is here enacted, come upon the scene."

There are over sixty active geysers in the park, the largest number in any geyser region in the world. In size and volume they vary widely, the smallest being tiny fountains sending at frequent intervals a small jet of water to the height of four or five feet; the largest is the Giant, which throws a column of water five feet in diameter to the height of 250 feet and sustains the flow for an hour and a half. The Upper Basin is a valley about one and a half miles long and one-half mile broad. It is drained by the Firehole River, along whose banks the largest geysers are situated. Within this basin are thirty geysers.

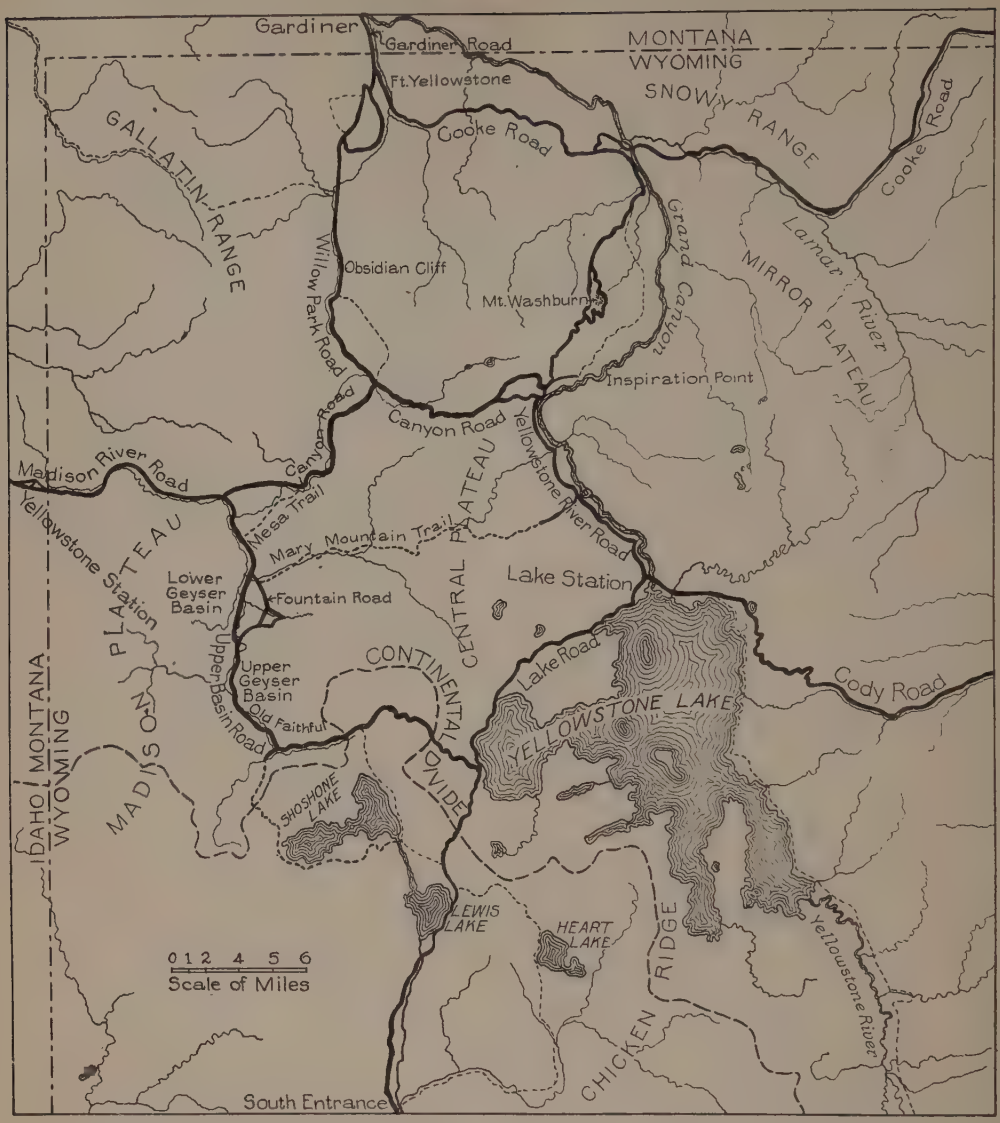
Old Faithful, so named because of the regularity of its eruptions, is the most widely known of all the geysers, though several are larger. Since its discovery in 1871, summer and winter this geyser has never failed to play at intervals of seventy minutes, sending up a silvery cascade to the height of 150 feet. The display continues for seven to eight minutes, and during this time the geyser pours forth 1,500,000 gallons of water. We get some idea of the magnitude of the forces in operation here when we learn that Old Faithful alone discharges enough water to supply a city of 300,000 inhabitants. The other geysers of special interest are the Beehive, the Castle, the Grotto, the Riverside and the Giant. Their periods of eruption vary from a few hours to six or ten days, so many tourists pass through the park without seeing them in action. In general, the larger the geyser the longer the period between eruptions.

Geyser waters hold silica in solution, and at each eruption a minute quantity of the silica is deposited on the walls of the crater by evaporation of the water. In this way, during untold ages, the geysers have been building up around their openings mounds of indescribable beauty. The Beehive, the Castle and the Grotto take their names from the form of their respective craters, and the crater of the Oblong displays a combination of delicate tints that none but the Great Artist could ever paint.

*Hot Springs.* There are about 4,000 hot springs within the boundaries of the park, and the floors of the geyser basins are covered with them. Their temperature varies from 60° to 175°. Many of them boil, and to the casual observer appear to have the temperature of boiling water. Most of the boiling, however, is due to the escape of gas.

Mammoth Hot Springs, five miles from Gardiner, are by far the most famous of all these springs. The water holds limestone in solution, and as it cools the limestone is solidified and deposited on the sides of the crater over which the water flows. Thus during the ages of their existence these springs have built up a series of terraces which form a small mountain, covering an area of 250 acres and having an altitude of 350 feet. The terraces are objects of rare beauty, because of their delicate structure and variety of color. Some are bright yellow, others are brown, and others are of a terra-cotta hue; those over which the water has ceased to flow are white. As one gazes upward from the foot of these terraces they look like beautiful cascades of color. The water is remarkably clear, and the reflection from the bottom of the spring gives it a delicate blue tint.

Many of the hot springs in the geyser basins are of interest because of their beautiful coloring, which, strange as it may seem, is caused by the reflection of light from the crater, for the water in all is remarkable for its clearness. Prismatic Lake, between the Upper and Lower basins, is a pond of boiling water from whose




MAP OF YELLOWSTONE NATIONAL PARK

surface are reflected all the tints of the rainbow. Morning-glory Spring, in form and coloring, is a perfect representation on a gigantic scale of the flower it typifies. But perhaps Emerald Spring, whose translucent green has never been surpassed by the costliest emerald that ever lent its charm to a monarch's crown, is the gem of them all. In variety of coloring and delicacy of structure, the craters of these quiescent springs equal and in some cases even surpass the craters of the geysers. A famous traveler who has seen nature's wonders in every part of the world says of them:

> Some of the most exquisitely beautiful objects I have ever seen in any portion of the world are the superbly-tinted caldrons of the Yellowstone.

*Lakes, Rivers and Falls.* The Continental Divide passes through the park in an irregular line from the southeast to the northwest. The region south and west of the Divide, comprising a little less than one-fourth of the park, is drained by the Snake River into the Columbia and thence into the Pacific Ocean. The Gibbon, the Firehole and the Gallatin rivers unite to form the Madison, which drains the western part of the park into the Missouri; the eastern

part is drained by the Yellowstone and its tributaries into the same stream. All these rivers are clear and cold, and in many places are beautified by falls and rapids.

The sources of the different river systems are near to each other along the Continental Divide. Two Ocean Plateau, in the southeastern part of the park, is so named because within its boundaries streams belonging to each river system have their source, and Two Ocean Pond, during high water, feeds streams connected with each system.

There are over thirty waterfalls in the park, and some of them are of surpassing beauty and grandeur. Among those especially worthy of mention are Firehole Falls, over the Firehole River, sixty feet; Gibbon Falls, eighty feet; Kepler Cascade, eighty feet; Osprey Falls, 150 feet, and Tower Falls, 132 feet. The falls of the Yellowstone are described below.

Yellowstone Lake is the most important body of water within the park. It has an area of 139 square miles and a depth of 300 feet, and its surface is 7,741 feet above the level of the sea. Could Mount Washington, the highest peak of the White Mountains, be set in Yellowstone Lake with its base at sea level, its summit would be nearly 2,000 feet below the surface. With the exception of Lake Titicaca, in Peru, this is the largest body of water in the world at so great an altitude. The water is clear and cold, and the lake abounds in fish. Near the shore of the western branch, known as the Thumb, are a number of hot springs whose cones rise above the surface of the surrounding water, and here an angler may catch a fish and without moving from his tracks cook it in one of these springs. For the convenience of tourists a fleet of launches and rowboats is kept at the Lake Hotel, near the outlet.

The other lakes of importance are Shoshone, Lewis and Heart, south of the Continental Divide; Beach and Dryad lakes, west of Yellowstone Lake; and a number of smaller lakes to the northeast of this body of water.

*The Falls and Canyon of the Yellowstone.* For the first sixteen miles of its course the Yellowstone River flows quietly through the broad and beautiful Hayden Valley. Then the current begins to increase in swiftness. Rapids are soon encountered, and these lead to the first plunge of the river into the great canyon beyond. The Upper Falls of the Yellowstone have a height of 112 feet. The water is broken into foam and spray by projecting rocks, and a beautiful cascade is formed. A short distance farther the channel narrows to a width of eighty feet, and the river makes another plunge of 310 feet. The Great Falls of the Yellowstone is one of the great cataracts of the world. In its leap the water is dashed into spray, which completely hides the lower part of the fall, and at certain hours of the day fills the gorge with rainbow tints. The narrow gorge gives full effect to the great height of the fall. the roar of the water is deafening, and the effect upon the beholder as he approaches the brink is almost overwhelming.

But surpassing all else in this land of wonders is the Grand Canyon, a gorge twenty miles long and in places over 1,400 feet deep. The first five miles include the section visited by tourists. This scene has been portrayed by the camera, by the brush of the artist and by the pen of many a ready writer, but only a personal observation can give one anything like an adequate conception of such a stupendous work of Nature.

*Other Objects of Interest.* Golden Gate Canyon and the canyons of the Gardiner and the Gibbon rivers are of more than passing interest. The Mammoth Paint Pots consist of a pool of boiling clay of various colors, whose movements resemble those of a huge kettle of boiling mush. Mud Geyser, in Hayden Valley, is a gruesome object, in marked contrast to the beautiful scenery in which it is set. Obsidian Cliff is a mountain of volcanic glass 250 to 300 feet high. Roaring Mountain is a hill near Norris Geyser Basin, from whose sides jets of steam issue with such force that they can be heard a mile distant. There are also numerous vents in other places from which steam escapes with terrific force. In the northeastern part of the park are the remains of a petrified forest.

**Administration.** Yellowstone Park was set apart by Congress in 1872 as a game preserve and a pleasure ground. For this admirable piece of legislation great credit is due Dr. F. V. Hayden, who, the year previous, made a thorough survey of the region for the government. The park is managed by the Department of the Interior and is under the direct supervision of a park commissioner, who resides at Mammoth Hot Springs (Fort Yellowstone), which is administration headquarters. Civilian scouts patrol the park all the year to protect the scenery and the game. Every one entering the park is required to register and to leave his firearms, or have them sealed. During the tourist season the scouts make daily visits to all geysers and hot springs, and so perfect is their system

of detecting any defacing of the formations that the desecrater seldom escapes. Previous to 1916 this supervision was by officers and men of the regular army.

**How to See the Park.** No better roads are to be found anywhere in the country than those in Yellowstone National Park. They were constructed by the national government and are kept in excellent repair. These roads lead from the three entrances—Gardiner on the north, Yellowstone on the west and Cody on the east—to all points of interest. A trip through the park is one of the most enjoyable excursions that one can imagine. In 1915 automobiles were admitted for the first time, and in 1917 they replaced horses for all transportation. Pleasure cars run on a slow-time schedule, which must not be exceeded, under penalty. Hotels, equal in their appointments to the best of those in large cities, are located at Mammoth Hot Springs, Upper Geyser Basin, the foot of Yellowstone Lake and the Grand Canyon. Several transportation companies maintain permanent camps, so a person is sure of good accommodations, let the line of transportation be what it may. Small parties may go by themselves and provide their own camping outfit, if they so desire. But after they have had their supplies raided by bears several nights in succession they are likely to fall back on a transportation company. A tour of the park by the Gardiner gateway requires a drive of about 150 miles. It may be made by automobile in five days and allow one time to enjoy the most interesting features. W.F.R.

Consult Chittenden's *Yellowstone Park;* Burton Holmes's *Travelogues,* volume on *Yellowstone Park;* Murphy's *Wonderlands of the American West.*

**YELLOWSTONE RIVER,** a river of Montana, which rises in the Shoshone Mountains of Northwestern Wyoming and flows north into Yellowstone National Park, where it widens into Yellowstone Lake, twenty miles long and fifteen miles wide. Narrowing again to a river, it plunges over the Great Falls and into the Grand Canyon of the Yellowstone (see YELLOWSTONE NATIONAL PARK). It then flows northeast again across the southeastern corner of Montana into the Missouri River, which it reaches at Fort Buford, just beyond the boundary of Montana and North Dakota. It is 500 miles long, and has a drainage basin of 67,500 square miles. Billings, the commercial center of a vast stock-raising district, and Miles City, a shipping center for wool, are on its banks.

**YEM'EN,** a territory in the southwestern part of Arabia, noted for its excellent coffee. It adjoins the British possession, Aden, on the south, and extends northward on the eastern border of the Red Sea from the Strait of Bab-el-Mandeb to Hedjaz. It has an area of about 73,800 square miles, and is of a mountainous character, with lofty plateaus from 8,000 to 10,000 feet high, which extend into the interior. A series of arid terraces rise from the coast to the mountains, but there are many valleys rich in the vegetation of the tropics. Transportation over the mountains is by caravans, and Hodeida is the leading port. Stock raising is the chief pursuit of the inhabitants, who number about 750,000.

LOCATION MAP

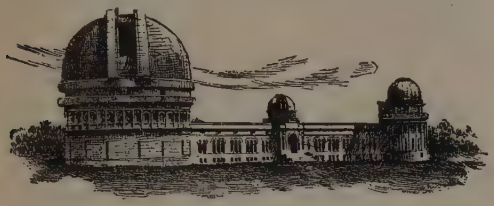
In this little section, in the Southwestern part of the Arabian peninsula, nearly all the Mocha coffee of the world is raised.

**YEN,** the monetary unit of Japan, valued at $0.498 in United States money—practically fifty cents. The name is from the word *yuen,* which means any round object. While the Japanese standard of value is the gold yen of three-fourths of a gram weight, such a coin is never minted, but the two-yen, five-yen, ten-yen and twenty-yen pieces are common. There was formerly a silver yen, but this has been withdrawn from circulation.

**YENISEI,** *yen e seh' e,* one of the longest rivers in the world, traversing Siberia from the Mongolian border to the Arctic Ocean. It rises in the Sayansky Mountains in the northwestern part of Mongolia (see map, *Asia,* opposite page 417), and follows a general northwesterly course, entering the Arctic through a great estuary a few miles east of the Gulf of Ob. The Yenisei proper is about 2,500 miles in length; if the estuary be included, the river has a length of 3,000 miles. Minusinsk, near the mouth of the Angara River, is at the head of navigation for small boats; ocean-going steamers ascend the river to Yeniseisk. Through its navigable tributaries and several canals the Yenisei has an important part in the navigable waterway system of West Siberia, and it is the connecting link between Lake Baikal and trade centers on the Ob. The stream is crossed near Krasnoyarsk by the

Trans-Siberian Railway. At this point the river is free from ice over half the year, but near its mouth it is ice-bound the greater part of the time.

**YERKES OBSERVATORY,** *yer'keez ob zer' va to ri,* the astronomical observatory of the University of Chicago, located about seventy-five miles north of Chicago at Williams Bay, on Lake Geneva, Wis. It is among the largest



THE YERKES OBSERVATORY

and finest of such institutions, and contains the largest refracting telescope in the world, with a lens forty inches in diameter, weighing 760 pounds (see TELESCOPE). The telescope is adjusted by delicate electrical devices, and the floor below it may be raised or lowered to enable the spectator to use the eyepiece when the instrument is placed at any angle. The observatory was founded in 1892 by Charles T. Yerkes, who furnished the funds for the building and its equipment, and it was completed in 1896. It has been used by eminent astronomers, and many notable discoveries and studies of the planets and stars have been made through its great telescope.

**Charles Tyson Yerkes** (1837-1905) was born in Philadelphia and became a broker. In 1871 he failed in business, made an assignment and was imprisoned for a short time because just before making his assignment he refused to turn over to the city funds which he had received from the sale of city bonds. He was soon pardoned. In 1874 he reëstablished himself in business in his home city and by fortunate investments soon was an important factor in Philadelphia's street-car system.

Yerkes removed to Chicago in 1881 and within five years gained almost absolute control of that city's street cars. There was much scandal connected with his efforts to secure long-term franchises from the Illinois legislature. He helped finance the underground railroad system of London, England.

**YEW,** *yoo,* the name given to a family of evergreen trees and shrubs with spiny foliage, scarlet berries and purplish, scaly bark. The *Old-World yew,* a native of Europe, Asia and Africa, is especially abundant in the region of the English Channel, where the chalky soil seems best adapted to its growth. This tree has mournful associations, having been planted, in former times, in English churchyards. It was also used for funeral decorations, and its leaves were twined into wreaths for the mourners' heads. Long ago warriors' bows were made of its tough, elastic wood, which possesses a grain rivaling that of mahogany and which is sometimes polished and made into tables. There is a record of one yew which attained a circumference of fifty-seven feet, and an age of almost 3,000 years.

The beautiful *Pacific* species, distributed along the coast from Alaska to California, which grows to a height of seventy-five feet and attains a diameter of five, yields wood much used for fences, bows, posts and paddles. *Florida yew* is a small, bushy, many-stemmed tree, while the *Eastern yew,* wrongly called *ground hemlock,* is not a tree at all, but a spreading shrub, the hardiest of the family.

**YGGDRASIL,** *ig'dra sil,* the great world ash of Norse mythology, called the *tree of the universe* because its wide-spreading roots bound together heaven, earth and the underworld. Literally, its meaning is *bearer of Odin,* or *Yggr.* Beneath its branches, evergreen and dripping honey, the gods held daily council. Each of its three roots was watered by a miraculous spring. Four stags, a squirrel, a serpent, an eagle and a falcon dwelt in the tree, the falcon reporting all that happened in the three kingdoms. Yggdrasil is undoubtedly symbolized in the modern Christmas tree.

**YOKOHAMA,** *yo ko hah' mah,* the chief treaty port and commercial center of Japan, is situated on the eastern coast of the island of Hondo, on the Bay of Tokyo. It is about seventeen miles southwest of Tokyo, with which it is connected by the first railway constructed in Japan (1872) (see map, *Asia,* opposite page 417). The situation is unusually attractive, with Mount Fujiyama in the distance and the beautiful bay, twelve miles wide here, the most conspicuous features.

Yokohama is the great silk emporium of the Empire, and is the place where most tourists enter Japan. Within recent years it has experienced a very rapid growth, as it was only a small fishing hamlet until the treaty of commerce, concluded with America in 1858, opened the port to foreign trade and to foreign residents. The bay is enclosed by two great breakwaters, 12,000 feet in length, and has an iron pier 2,000 feet in length, which is con-

nected with the railway leading to Tokyo, the capital. The commercial district has a number of notable and imposing buildings; the well-wooded hill known as "The Bluff," on the south, is covered with the beautiful homes of foreign residents. In the vicinity is found the magnificent bronze image of the Great Buddha, fifty feet high and one of the greatest of Japanese works of art.

Yokohama has telegraphic communication with Europe and America, through Tokyo, Nagasaki, Shanghai and Vladivostok. The chief exports include silk goods, tea and lacquered wares, fish, metals and paper, and the principal imports are sugar, cotton and woolen manufactures and raw cotton. Population in 1913, 397,574.

**YONGE,** *yung,* CHARLOTTE MARY (1823-1901), a novelist and essayist, born at Otterbourne, England, where most of her life was spent. She was a woman of extraordinary energy, and she produced books with a rapidity scarcely equaled by any other woman writer of English literature. More than 125 volumes bear her name, and these include a wide variety of subjects—novels, short stories, biographies, religious essays, literary criticisms, histories and numerous schoolbooks. Among her best novels are *The Heir of Redclyffe, The Daisy Chain* and *The Dove in the Eagle's Nest,* all dealing with English rural life and possessing a good deal of romance and sentiment.

Unfortunately, Miss Yonge felt it her duty to teach and moralize in everything she wrote, and to many this tendency greatly decreases the pleasure in reading her fiction. In her historical works, such as *Landmarks of History, Cameos of English History* and *English Church History,* this tendency is not out of place, and the books are valuable sources of information. She was a zealous worker for the Church of England, and gave a large portion of her book royalties to its schools and missionary work.

**YONKERS,** *yong'kerz,* N. Y., a residential city in Westchester County, fourteen miles north of the center of New York City. The site, covering an area of nearly fourteen square miles, extends four miles along the east bank of the Hudson River and gradually rises eastward to elevations which offer magnificent views of the river and the Palisades. Four divisions of the New York, New Haven & Hartford Railroad, electric lines and regular boat connections with Albany and New York supply transportation. The population increased from 79,803 in 1910 to 99,838 (Federal estimate) in 1913.

A conspicuous feature of Yonkers is its great number of beautiful homes, many of which are owned by New York business men. Philipse Manor Hall, a fine example of colonial architecture, dating from 1682, was used as a city hall from 1872 until 1908, when it became the property of the state and was made a museum of colonial and Revolutionary relics. The "Grey Stone," once the residence of Samuel J. Tilden, is also a feature of interest. Other prominent structures are the new city hall, erected at a cost of $500,000; the Carnegie Library, which stands in Washington Park; Saint Joseph's Catholic Seminary, the Woman's Institute and the Hollywood Inn for Workingmen. Among the institutions of the city are the Hebrew Home for Aged and Infirm, the Leake and Watts Orphan House, and the Homeopathic, Saint Joseph's and Saint John's Riverside hospitals. The parked areas include Grant, Irving, Washington, Sunset, Glen and Manor Hall parks. On the Hudson is a steel recreation pavilion.

While principally a residential city, Yonkers has important manufacturing industries. Of these, sugar refining and the manufacture of carpets and rugs, hats, foundry and machine-shop products and rubber goods are the chief. Other products are elevators, patent medicine and compounds, silk and clothing, and the city also has shipbuilding yards and lumber and flour mills.

In 1645 a grant of land which included the present site of Yonkers was obtained by Adrian Van der Donck, who was known as De Jonkheer, or "young nobleman," by tenants who settled on his estate. In 1672 the land became a part of the Philipse Manor. The settlement, called Philipsburg, was incorporated as the village of Yonkers in 1855. The town was divided in 1872, and the northern portion was chartered as the city of Yonkers; the southern portion was incorporated as Kingsbridge, and in 1874 was annexed to New York City.

**YORK,** *yawrk,* a quaint old city of England, which was conspicuous in almost all the great epochs of English history, and was a center of wealth and authority when London was only a village. It is a parliamentary and county borough and the capital of Yorkshire, and is situated about midway between Edinburgh and London, at the union of the Foss and Ouse rivers. The city proper is enclosed by massive stone walls, at present used as promenades, through which entrance is obtained by four imposing gateways; its narrow, irregular streets

and quaint old houses give it a medieval aspect. Several bridges connect the city with beautiful suburbs on the opposite bank of the Foss River.

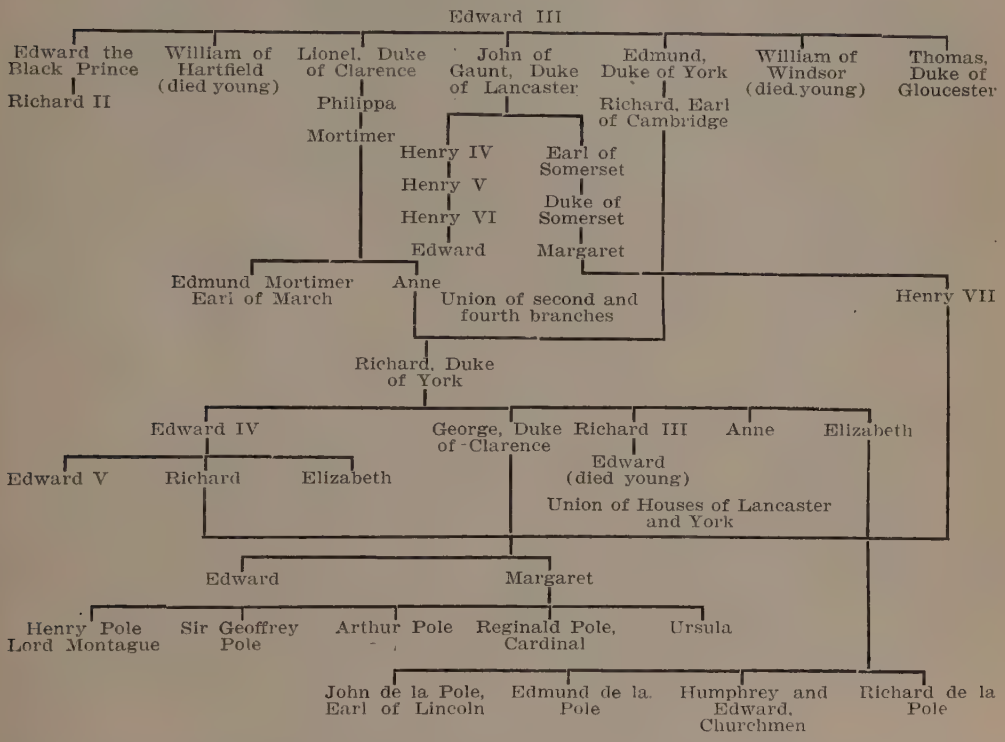
The chief glory of the city is the great York Minster, one of the noblest Gothic structures ever built. It is in the form of a Latin cross, with an extreme length of 525 feet and an extreme width of 250 feet. A massive central tower rises to a height of 213 feet. This wonderful cathedral dates from the eighth century, but reached its present form in 1472. York contains many other structures of worship, notable buildings, institutions and libraries, and one of the finest railroad stations in the United Kingdom. The principal manufactures are bottles, leather, flour, cocoa and confectionery. Population in 1911, 82,282.

**YORK,** House of, a royal family of England which wrested the crown from the House of Lancaster during the Wars of the Roses. Richard, Duke of York, the founder of the royal line, was descended through his mother from the third son of Edward III, and through his father from Edward's fifth son. He claimed the throne, which was occupied by Henry VI, who was descended from the fourth son of Edward III. Richard's claims were recognized by the lords, and an act was passed providing that upon the death of Henry VI the crown should pass to Richard and his heirs.

Henry's queen, Margaret of Anjou, opposed this arrangement, as it disinherited her son. She summoned an army to support the House of Lancaster, and her adherents adopted the red rose, as their symbol. Many ambitious nobles joined the cause of the white rose, that is, of the Yorkists, and the struggle between the two houses lasted thirty years. In the first conflict (1460) Richard was captured and beheaded, but in the following year his son entered London and was crowned king as Edward IV.

In 1483 Edward was succeeded by his young son, Edward V, who, after a nominal reign of two months, was put aside by his ambitious uncle, the Duke of Gloucester. The latter then assumed the throne as Richard III. Later Edward and his younger brother, Richard, were secretly murdered in the Tower by their uncle's order. In 1485 the usurper was killed in a battle with Henry Tudor, Earl of Richmond, a

**Genealogical Table of the House of York.**



descendant of the House of Lancaster. Henry married the daughter of Edward IV, and so united the two royal families. He was crowned as Henry VII, the first of the great Tudor monarchs.

**Related Subjects.** The following articles in these volumes will explain references in the above discussion:

| | |
|---|---|
| Edward, subheads *Edward IV* and *Edward V* | Lancaster, House of |
| | Richard, subhead *Richard III* |
| Henry, subheads *Henry VI* and *Henry VII* | Roses, Wars of the |

**YORK,** Pa., a manufacturing city in York County, of which it is the county seat, situated in the southeastern part of the state, ninety-six miles west of Philadelphia and twenty-eight miles southeast of Harrisburg, the state capital. The Pennsylvania, the Western Maryland and the Maryland & Pennsylvania railways provide transportation, and interurban lines operate in various directions from the city. In 1910 the population was 44,754; in 1916 it was 51,656 (Federal estimate); less than two per cent of this number are foreign born.

York is the commercial center of a fertile farming section. Immense power is generated at Yorkhaven, about ten miles above the city, by means of a crib dam, thereby increasing the facilities for manufacture. Foundries and machine shops are the leading industrial plants; chains of all kinds are made, one of the largest chain works in the United States being located here. Dental-supply, wall-paper and cigar factories also have an extensive output, and the manufacture of water wheels, lime, cement and silk is considerable. York has a $500,000 Federal building, a handsome county courthouse, a county jail, a city hall, a Masonic Temple and four market buildings. For advanced education it has York County and Saint Patrick's academies, York Collegiate Institute, two free libraries and the county law library. There are five hospitals, the county almshouse and a home for children.

York, named for the English town of York, is the oldest permanent settlement in the state west of the Susquehanna River. It was settled by Germans in 1729, and was originally a portion of Lancaster County. The county of York was formed in 1749, when the town of York became the county seat; it was incorporated as a borough in 1787 and as a city in 1887. Fearing capture by Howe's army, the Continental Congress left Philadelphia and held sessions here from September, 1777, until June, 1778; it was therefore once the capital city of the republic. In 1913 York adopted the commission form of government.

**YORKTON,** *yawrk'ton,* a town in Southeastern Saskatchewan. It is served by branches of three great transcontinental railways—the Grand Trunk Pacific, Canadian Pacific and Canadian Northern—and by the shortest routes is twenty-seven miles southwest of Canora, fifty-six miles northeast of Melville, 154 miles northeast of Regina, 201 miles east of Saskatoon and 278.5 miles northwest of Winnipeg. Population in 1911, 2,309; in 1916, 3,144.

Yorkton is an important shipping point for wheat, and has an elevator capacity of about 250,000 bushels. It also has a flour mill, a number of farm-implement agencies, and a variety of manufacturing establishments. It is the center of a judicial district and of a Royal Northwest Mounted Police district, and has Dominion lands and land-titles offices. The courthouse is a noteworthy structure. The municipality owns and operates the electric light and power plant, waterworks and sewerage system. York Lake, four and a half miles away, is a popular summer resort.

**YORKTOWN,** Sieges of. Yorktown, the county seat of York County, Virginia, has twice figured prominently in American history—in 1781 and in 1862. The first siege was especially noteworthy because it brought to a close the Revolutionary War in America. Cornwallis, with his army of 8,000, took possession of the town in August, 1781, and fortified it strongly; and on September 28, Washington arrived before the walls with his force of 16,000 men, while a French fleet cut off the aid which Cornwallis had expected to receive from the vessels anchored in the York River. The American forces threw up their defenses, and on October 9 the bombardment began, Washington himself touching off the first cannon. The firing continued for more than a week, and on October 18 Cornwallis was forced to surrender. This was the last real battle of the war. In 1881 an elaborate monument was erected to commemorate Washington's victory.

The second siege of Yorktown, an event of the War of Secession, began on April 5, 1862. The Confederate general, Magruder, with about 15,000 men, held the town, while before the walls was encamped a force of 53,000 Federals under General McClellan. Shortly after the firing opened the Confederates were reënforced until their number was 55,000, while the reënforced Federal army numbered 95,000. On the

**IN YOSEMITE PARK.** In the middle distance is the beautiful Bridal Veil Fall, 1,500 feet in height. So great is the descent that the lower half of the torrent breaks into mist, reflecting at times the tints of the rainbow. The falls are mirrored in the lake.

night of May 3 General Johnston, who had assumed command of the Confederate forces, evacuated the town secretly, and retreated towards Richmond, but he was pursued by the Union army and compelled to give battle at Williamsburg.

**YOSEMITE,** *yo sem'i te,* **NATIONAL PARK,** one of the most beautiful spots on the American continent, known best for its treasure house of scenic loveliness, the Yosemite Valley. It lies just west of the summits of the Sierra Nevada Mountains, in Central California, and covers an area of 719,622 acres. The park can be reached from Merced (on the Atchison, Topeka & Santa Fe and the Southern Pacific railroads) by way of the Yosemite Valley Railroad, which extends to the western border; the same roads have connections to Raymond, on the southwest. Stage lines are operated to Yosemite Valley from Raymond and from the terminus of the Yosemite Valley Railroad. Hotel accommodations may be secured throughout the year, though the regular tourist season is from May 1 to November 1.

**Yosemite Valley.** Back in the days of the "gold rush," after 1849, when much of the mountain region was still unknown territory, even to prospectors, a party of settlers riding in pursuit of marauding Indians suddenly found themselves in a valley whose beauty was impressive even to those who dwelt in a land of charming scenes. Here a mountain river, the Merced, taking advantage of cracks in its granite bed, had in the space of a few thousand years carved a much deeper course than its several tributaries, leaving their outlets high in the air. Then had come a glacier, a river of ice which enlarged the cut until in its seven miles of length it was in places over a mile wide and nearly a mile deep. When the glacier had disappeared, leaving its history sculptured on the rocks, the waters of the tributary streams, tumbling to reach the valley bottom, formed lovely cascades, among them the Vernal Falls, 320 feet high and famous for its rainbows; the Bridal Veil, falling 620 feet, a column so slender that it disappears in spray; the Yosemite Falls, dropping first 1,430 feet, then leaping from rock to rock a distance half as great, finally to fall another 320 feet, or twice the height of Niagara; and the Ribbon, tallest cascade of all, with an unbroken drop of 1,612 feet.

Rising abruptly from the flower-carpeted floor of the canyon are a number of rocky masses, which from real or fancied resemblances have been given such names as El Capitan (Spanish for *The Captain*) and Half Dome. The peak called Cloud's Rest rises 6,000 feet, more than a mile, above the valley, which is itself 4,000 feet above the sea.

**Elsewhere in the Park.** Until 1906 the Yosemite Valley and its neighbor spectacle, the Mariposa grove of giant sequoia trees, were not a part of the national park but were the property of the state of California, which has ceded them to the Federal government. But they occupy only a fraction of the 1,125 square miles. To the north and east of them lies another land of enchantment, in the words of John Muir—

> The headwaters of the Tuolumne and Merced rivers, two of the most songful streams in the world; innumerable lakes and waterfalls and smooth, silky lawns; noblest forests, the loftiest granite domes, the deepest ice-sculptured canyons, the brightest crystalline pavements, and snowy mountains soaring into the sky 12,000 and 13,000 feet, arrayed in open ranks and spiry, pinnacled groups partially separated by tremendous canyons and amphitheaters; gardens on their sunny brows, avalanches thundering down their long, white slopes, cataracts roaring gray and foaming in the crooked rugged gorges, and glaciers in their shadowy recesses working in silence, slowly completing their sculptures; new-born lakes at their feet, blue and green, free or encumbered with drifting icebergs like miniature Arctic Oceans, shining, sparkling, calm as stars.
>
> C.H.H.

Consult Bunnell's *Discovery of the Yosemite.*

**YOSHIHITO,** *yohsh i he' toh,* HARUNOMIA (1879- ), emperor of Japan, succeeding his father Mutsuhito, who died in 1912. At the age of eight, at the same time that he was named heir-apparent to the throne, he received the decoration of the Grand Order of Merit and a commission as colonel in the Imperial Royal Guards. His education, received at Tokyo, was liberal, and the emperor speaks fluently French, English and German. Because in his childhood he was delicate in health, he was taught to find much exercise out-of-doors. The young man became a lover of horses and dogs, and untiring in his devotion to sports of every proper kind. Like his father, he is simple in dress and direct in speech, much to the dismay of those older members of his court who yet cling to the medieval customs of the first years of his father's reign.

In his policy Yoshihito endeavors to maintain the old traditions and ideals of the Empire, but only in so far as they do not affect his country's advancement and menace its position among the great powers of the world. From his youth he was trained to be a constitutional

monarch, the first of all the Japanese monarchs who was not born to rule with absolute power. He married his cousin, Princess Sada-ko, in 1900, and of three children, the oldest, Hirohito, has been named heir-apparent to the throne. The meaning of the name *Yoshihito* is *good man.*

**YOUNG,** *yung,* BRIGHAM (1801-1877), second president of the Church of Jesus Christ of Latter-Day Saints (see MORMONS), and doubtless the best-known Mormon of all time, possibly surpassing in fame the founder of the Church, Joseph Smith. He was born at Whitingham, Vt., of a well-known colonial family; his great-grandfather, William Young, was a worshiper at the Old South Church, Boston; his grandfather Joseph served as a physician and surgeon in the French and Indian Wars, while his father fought with Washington in the Revolution. Young's early life was spent on his father's farm; he later learned the trade of painter and glazier, working at this occupation until he was thirty-one years of age, when he reached the turning point in his career. Two years before, in 1830, a new Church of Latter-Day Saints, or Mormons, had been organized at Fayette, N. Y., by Joseph Smith. Young became interested in the doctrines of the sect, embraced the new religion and settled with the members of the Church at Kirtland, Ohio, where he soon formed a close friendship with Smith.

BRIGHAM YOUNG

The great leader of the Mormon Church for a third of a century.

From the beginning of his association with the Mormons, Young revealed the qualities of a great leader, and his knowledge of character, his strong will and magnetic personality soon gave him an influential position in the Church. He was ordained one of the Council of Twelve Apostles in 1835, and a year later was chosen the president of that body. The new sect then began to feel the bitterness of persecution; the saints were driven from Kirtland, and after many months of wandering, Young and Smith founded a new colony at Nauvoo, Ill. For a time all went well, and Young made a trip to the British Isles in 1839-1841 for the purpose of presenting the new doctrines to the people there. In 1844, however, affairs in the Church came to a crisis. Smith was shot, Nauvoo was threatened by a mob, and the Twelve Apostles were scattered.

At this point, when the Church seemed in danger of falling to pieces, Young's ability as a leader strongly asserted itself. Being absent from Illinois at the time of Smith's murder, he at once hurried to Nauvoo. As the president of the Twelve Apostles he took the direction of affairs, and this council of the Twelve naturally became the supreme ruling quorum of the Church. Young, however, had the foresight to realize that the Mormons could never maintain a strong Church organization in the Mississippi Valley, and that they must work out their destiny in newer country far to the west, according to a previous plan authorized by the Prophet Joseph Smith. In the winter of 1846 they began their emigration toward the land of the setting sun, and in the summer of 1847, the first detachment of colonists, consisting of Young and 143 of the faithful, reached the shores of Great Salt Lake, in Utah, the site of their new city. After establishing a colony and leaving a sufficient number of the people there to begin farming operations, Young returned with the remainder to winter quarters, near the present Florence, Neb. There, on December 5, 1847, he was chosen president of the Church, as Smith's successor.

In 1848 Young returned to the Salt Lake Valley, and there under his guidance and inspiration the Mormons permanently established their Church, built a great city and transformed the barren desert valley into a rich and fruitful country. It was, of course, in the natural course of events that he should also be prominent in the political history of Utah. In March, 1849, a convention at Salt Lake City organized the State of Deseret, of which he was elected governor; in 1850 Utah was admitted as a territory and he became its governor. During the next few years difficulties arose between the state authorities and the Federal government, and in 1857 President Buchanan appointed a territorial governor in place of Young. In consequence of misrepresentation, misunderstandings arose between Utah and national government officials, which were later adjusted peaceably.

It has been said of Young that he possessed the qualities of a Cromwell, a Moses and a Napoleon. Certainly he was a man of positive character and achievements. He was a devout follower of all the doctrines taught by the

founder of the Church, and he consistently followed the doctrine of the "celestial law of marriage." When he died in 1877 he left an estate valued at more than $1,000,000. He was survived by possibly nineteen wives, and was the father of fifty-seven children. M.M.B.

Consult Kennedy's *Early Days of Mormonism;* Tullridge's *Life of Brigham Young.*

**YOUNG,** Charles Augustus (1834-1908), an American astronomer who, in 1869, had the honor of being the first to make an observation of the spectrum of the solar corona (the luminous envelope of the sun). He was born at Hanover, N. H. After his graduation from Dartmouth College in 1853, he taught for two years at Phillips Academy, Andover; was professor of natural philosophy and mathematics in the Western Reserve College, Ohio, from 1856 to 1866, and in the latter year accepted the chair of astronomy and natural philosophy at Dartmouth. In 1877 he was made professor of astronomy at Princeton, and there he taught until shortly before his death.

Professor Young was an eager investigator of natural phenomena, and was outdone by none of his contemporaries in activity and zeal. He lent his knowledge and aid to the eclipse parties to Iowa in 1869, to Spain in 1870, and to the transit of Venus party to Peking, China, in 1874; he also organized the eclipse expedition to Denver in 1878. In 1872, at Sherman, Wyo., he made the important discovery of the bright reversal of many lines of the solar spectrum in ordinary sunlight. Recognized as an authority on the subject of spectra, he was invited to lecture in the courses of the Peabody Institute at Baltimore, the Lowell Institute at Boston, and at many colleges. Important among his writings are *The Sun, General Astronomy, Elements of Astronomy* and *Lessons in Astronomy,* the two latter attaining wide popularity as school textbooks.

**YOUNG,** Edward (1683-1765), an English poet, born at Upham, in Hampshire. After his graduation he attempted to gain the favor of various influential people by writing poems in their honor. In 1719 he produced the tragedy *Busiris* and two years later *Revenge,* which was favorably received. In 1725 was published the first of the group of satires produced during the following three years, entitled *The Love of Fame, the Universal Passion.* After taking holy orders in 1728 he was made a king's chaplain, and in 1730 became rector of the church at Welwyn in Hertfordshire, where he continued to live until his death.

Between 1842 and 1845 appeared the famous *Night Thoughts on Life, Death and Immortality,* for which he is chiefly remembered. This work is theological in its nature, expresses certain universal truths in forceful manner, and attains at times to considerable height, but it has not the simplicity and directness which make a really helpful religious poem. Among the very commonly quoted lines from this poem are:

Blessings brighten as they take their flight.

Procrastination is the thief of time.

By night an atheist half believes a God.

**YOUNG,** Ella Flagg (1845- ), an American educator of note, the first woman to serve as superintendent of schools in any large city of the world. She was born in Buffalo, studied at the Chicago Normal School, began to teach in 1862 and in 1868 was married to William Young. Later she studied at the University of Chicago and received the Ph. D. degree. From 1887 to 1899 she was district superintendent of schools in Chicago, in the latter year became professor of education at the University of Chicago, and in 1905 was chosen principal of the Chicago Normal School. This position she resigned in 1909 to accept the superintendency of the Chicago public schools. That important post she held until 1915, with the frequently-voiced approval of the people of her city. Her chief contribution to the school system of Chicago was the introduction of studies of the practical kind, paving the way to more formal vocational training. After her resignation she was active in the movement for woman suffrage.

ELLA FLAGG YOUNG

She has held positions of honor in various educational associations, has been president of the National Education Association, and is the author of *Isolation in the School, Ethics in the School* and *Some Types of Modern Educational Theory.*

**YOUNG ITALY,** a society of Italian republicans, founded by Giuseppe Mazzini in 1831. The aim of the society was to free the Italian peninsula from Austrian rule and to bind the

country together under a republican government. Unlike other organizations with similar purposes, the Young Italians did not try to effect their ends by conspiracy, but rather by open insurrection. Mazzini was somewhat impractical, and his first open move, an attack on Savoy in 1834, failed. The society declined in influence thereafter, but it had set an example which was followed in several countries. Its tricolor standard of red, white and green is the present Italian flag. See ITALY, subtitle *History of Italy*.

**YOUNG MEN'S CHRISTIAN ASSOCIATION, THE**, an organization for the promotion of the spiritual, intellectual, physical and social welfare of men and boys throughout the world. The object of the organization is not to supplant the churches, but to increase their membership and to serve as the "church of the other six days." For nominal fees the association offers to young men homes in its modern and comfortable buildings and hotels, where they may enjoy the privileges of good libraries, reading and social rooms and a free employment bureau; members have the privileges of the gymnasium, classes in commercial and mechanical studies, Bible classes, lectures and social organizations. Any young man, regardless of race or creed, may become a member, but the privilege of voting and holding office is extended only to members of an evangelical church. Much personal help is also given to those who are in need of advice and encouragement.

The field of work has spread from the city to rural districts, and separate branches have been established for railroad employees, college students, soldiers and sailors, Indians and negroes. Another of the later phases of the work has been the development of the boys' department, which is now a large and important feature of every city and county association. Secretaries are employed to devote all of their time to the boys' work; classes and recreation rooms are provided exclusively for their use, and summer camps are maintained under the directorship of the secretaries.

About five-sixths of the trained and salaried secretaries employed in all associations are in the United States and Canada. The majority of these men are university graduates or have received special training in the Y. M. C. A. colleges, which are located at Springfield, Mass., and Chicago, and which maintain summer schools at Silver Bay, on Lake George, N. Y., and at Lake Geneva, Wis.

The local associations are affiliated in a state, national, international and world organization under the administration of state secretaries and national and international committees, which employ traveling secretaries in the Americas, Europe, Asia and Africa. There are about 2,600 associations in America having a total membership of over 820,000; the total value of their property exceeds $100,000,000.

**History.** The first association was founded in London in 1844 by George Williams, who organized a society of his fellow clerks for the purpose of holding religious services and studying the Bible. The movement rapidly spread to other business houses, and by 1848 quarters containing a library and reading and rest rooms were maintained in London. In 1851 associations were established at Montreal, Boston and New York. Three years later there were twenty-six branches in America, and a confederation was formed of the United States and Canadian associations which soon became preëminent in the world movement. In 1855 the International Committee was established and a convention was held at Geneva, Switzerland, which represented 329 associations. In 1866 the International Committee established headquarters at New York City.

The early movement was chiefly religious and evangelistic; the development of diversified work and the expansion into new fields began in 1878 after the world's convention at Geneva. Among the associations in the foreign field are those at Tokyo, Yokohama, Shanghai, Canton, Fu-chow, Calcutta, Constantinople, Manila and Havana.

A notable work was carried on during the War of the Nations by the British Associations among the troops in practically every training camp in England and at the front. The work was generously supported by the war office and by men of all ranks, and 700 centers containing recreation and reading rooms were established for the use of the troops. As soon as the United States began the work of organizing its national army (1917) the Y. M. C. A. started a campaign to raise money for the erection of recreation halls in the various training camps throughout the country. A vigorous campaign was also inaugurated to obtain funds for carrying on war relief work in Europe.

When the exceedingly important character of the work in the war zones was realized by the allied countries vast funds were raised to support the Y. M. C. A. In November, 1917, over $35,000,000 was subscribed by the people of the

United States to be spent in Europe close to the firing lines. E.B.P.

Consult Doggett's *History of the Young Men's Christian Association,* and the year books issued by the American and British branches.

**YOUNGS'TOWN,** Ohio, the county seat of Mahoning County and an important center of iron and steel manufacturing, is situated near the eastern boundary, in the northern part of the state, midway between Cleveland and Pittsburgh. The distance to either city is nearly seventy miles. The city occupies a fine site of nearly eleven square miles along both banks of the Mahoning River. It is served by the Baltimore & Ohio, the Erie, the Mahoning Valley, the New York Central, the Pennsylvania and the Pittsburgh & Lake Erie railroads, and by interurban lines. From 1910 to 1916 the population increased from 79,066 to 108,385 (Federal estimate).

Mill Creek, a natural park of 482 acres along both banks of the river, and Crandall, Lincoln and Wick parks are the largest of the city playgrounds. Prominent buildings and institutions are a Federal building, a county courthouse, the Reuben McMillan Free Library, Rayen Public School (endowed by the will of Judge William Rayen), a Y. M. C. A. building, the city and Mahoning Valley hospitals and the children's home. The river is crossed on Market Street by a steel viaduct. Steel plants, blast furnaces and rolling mills are the largest industrial establishments, and there are in addition lumber mills and manufactories of automobiles, brass castings, iron and steel pipe and oilcloth. Youngstown was settled in 1796 upon a tract of land bought by John Young from the Connecticut Land Company. The town was incorporated in 1848 and received its first city charter in 1867.

**YOUNG TURKS,** a reform party in Turkey, the members of which brought about the revolt of 1908-1909 and forced Abd-ul-Hamid to resign. The new government, however, showed a disposition to strengthen Turkish rule in all parts of the Empire, and the era of democratic reform expected by many Western nations did not materialize. The history of Turkey under the Young Turks is given in these volumes in the article Turkey, on page 5914.

**YOUNG WOMEN'S CHRISTIAN ASSOCIATION,** a world organization for women similar in aims and methods to the Y. M. C. A.; that is, it has for its purpose the religious, intellectual, social and physical development of the young people under its charge. The world organization, formed in 1894, is a league of eighteen national associations, with headquarters in London. The associations have a total membership of nearly 800,000. In December, 1906, the Y. W. C. A. of the United States of America was formed, but the work was really begun in 1858, when the "Ladies Christian Association" was organized in New York. Local societies were established in many other cities during the succeeding half century, and the organization formed in 1906 represented a union of these local bodies for more efficient work. There are now about 1,000 associations in the United States, and the total membership is about 340,000. The work is carried on through eight departments: secretarial, finance, conventions and conference, publication, office, foreign, field work and method. In 1916 Canada had thirty city and forty-eight college associations, five national secretaries and a membership in all associations of nearly 18,000.

For a summary of the scope of the work carried on by the Y. W. C. A. of the United States, consult the annual *Year Book,* published by the National Board (New York). Consult, also, Wilson's *Fifty Years of Association Work among Young Women.*

**YPRES,** *e'pr'*, familiarly known as *"wipers"* by the British soldiers, is a picturesque city in Belgium, the scene of much of the severest fighting during the War of the Nations.

The German artillery demolished many historic buildings and reduced the town to a state of ruin in the first year of the war, and each succeeding year saw some of the war's severest battles fought close to it. It was formerly the capital of the province of West Flanders, and, before the outbreak of the war, had a population of 17,000. It is situated thirty-five miles south of Ostend, twelve miles west of Courtrai on the Yperlée, a small stream flowing into the Yser, whose waters repeatedly ran red with blood during the gigantic struggle for the possession of Belgium.

The beautiful cathedral of Saint Martin, dating from the thirteenth century, the Halles, or cloth market, and the Butchers' Hall were among the finest buildings in the city, where also was located the Belgium cavalry training school. The city formerly possessed a good lace and linen trade and a great butter market. It seems almost improbable that Ypres, which suffered so terribly in the war, will regain for many years its once proud position among continental towns.

**YPSILANTI,** *ip si lan' ti,* MICH., the seat of the Michigan State Normal College, the oldest normal school west of New York, is a city in Washtenaw County, in the southeastern part of the state. It is situated on the Huron River, thirty miles southwest of Detroit and eight miles southeast of Ann Arbor, and is connected with both cities by interurban lines. It is also served by the Michigan Central railroad. The city has public parks, a Federal building, a public library and a public hospital. In the vicinity are mineral springs. The industrial establishments include manufactories of paper, knit underwear, flour-mill machinery and lumber. Ypsilanti was settled in 1825, and was named in honor of a Greek patriot, Demetrius Ypsilanti. The place was incorporated as a village in 1832 and became a city in 1858. Population in 1910, 6,230. H.F.S.

**YUAN SHI-KAI,** *yoo ahn' she ki'* (1860-1916), a statesman of China and the first president of the republic established in 1912. He was born in the province of Honan, of the Chinese rather than the dominant Manchu race, received a thorough education, according to Chinese standards, and in 1882 went to Korea; there he remained as resident-commissioner until the Chinese-Japanese War of 1894-1895 forced him to withdraw. He had a large part in the reorganization of the Chinese army and navy, and during the Boxer troubles of 1899-1901 appeared most favorably in the eyes of the Western nations, by reason of his attempts to protect the foreign legations.

YUAN SHI-KAI

**His Part in the Revolution.** Succeeding Li Hung Chang in 1901 as governor of Chi-li, he acquired great power, largely owing to the favor of the dowager empress, but in 1909 a series of intrigues against him forced his resignation. When the revolution against the Manchu rulers broke out in October, 1911, he was made head of the imperial forces, and a few weeks later became Prime Minister. The revolutionary movement assumed such proportions that it became necessary to allow the people to decide what form of government should exist in China, and when a republic was demanded Yuan Shi-Kai conducted the negotiations which led to the abdication of the emperor and the establishment of the new government. From February, 1912, to October, 1913, Yuan Shi-Kai was Provisional President, and at the latter date was regularly elected to the Presidency of the republic for a five-year term.

**As President.** A tremendous task then confronted him. There were 400,000,000 people in the republic, not half of whom had ever heard that the Manchu rulers had been deposed. He began to consolidate the power of the government; he put the army on a better basis, and he borrowed $125,000,000 in Europe and America as working capital. Several attempts to unseat him failed. In order that old traditions of his land might not be destroyed he ordered the restoration of the old religion, the worship of Heaven and Confucius. This act gave rise to the belief that he proposed to return to a monarchial form of government, with himself as emperor. Japan took advantage of the chaotic state by demanding and receiving extremely valuable commercial concessions.

The Chinese were alarmed at these inroads, and it was felt that the republic would not be strong enough to resist further aggressions—that a monarchy was needed. Yuan Shi-Kai was offered the throne, but at first declined, as official etiquette demanded. When it was offered the second time, as etiquette also demanded, his acceptance followed, and he proposed to serve as a republican President only until the coronation could be arranged. European powers objected to a return to the monarchy, but the leaders did not heed them. However, insurrections continually taxed the government, and three different times the coronation ceremonies were postponed. In March, 1916, it was definitely announced that the empire would not be proclaimed, and that China would remain a republic.

Then ensued a strong effort to wrest all power from Yuan. He was able to circumvent all plots in the army, but he died suddenly, in June, from the announced cause of stomach trouble. There is widespread belief that he was a victim of poison. E.D.F.

Consult Thomson's *China Revolutionized;* Bland's *Recent Events and Present Politics in China.*

**YUCATAN,** *yoo kah tahn',* a peninsula which occupies the extreme southeastern part of Mexico, between the Gulf of Mexico and the Caribbean Sea. It comprises the low, flat

states of Campeachy and Yucatan, of the Mexican republic, and is noted as being the world's chief source of sisal hemp (see SISAL). Its area of 55,400 square miles is nearly as great as that of the state of Iowa. It is a ledge of

LOCATION MAP

limestone little more than half covered with soil. Its shore line on the west, north and east is covered with shallow water, in which coral formation is actively going on.

Having a hot and humid climate, Yucatan furnishes ideal conditions for the growth of the sisal plant, which takes its moisture from the air. It is not grown successfully in any other region. Modern methods and machinery are used in its cultivation, and although the sisal plantations of Yucatan furnish yearly 200,000,000 pounds of fiber to American markets for the manufacture of rope and twine, less than twenty per cent of the best sisal-producing lands are cultivated, because of the scarcity of labor.

The natives are dependable, and are the paid laborers of the sisal fields. The best relations exist between them and the managers of the plantations, who are in reality the local magistrates, the plantations forming villages in themselves. Other than the natives, the majority of the population is Spanish. They are an intelligent people; they live in comfortable homes, educate their children, many of whom are sent to England and the United States for instruction, and are loyally developing their own country.

Yucatan is interesting as the seat of the ancient Maya race, the highest form of native civilization before the coming of the Spaniards, and it contains many ruins of their ancient cities. See MAYA INDIANS.

**YUCCA,** *yuk'a,* a genus of interesting plants of the lily family, native to the warm regions of North America. A very showy species, sometimes called *Adam's needle,* is often cultivated in gardens north of its native home, the Southern states. The plant bears a profusion of creamy-white, bell-shaped flowers, which in their setting of long, evergreen leaves, are a most beautiful spectacle. "The nodding bells," says one observer, "by moonlight are transfigured, and they fairly radiate a soft, silvery luster, impossible to describe." Another showy species, the *Yucca gloriosa,* has a stem from two to three feet in height, on the upper part of which is borne a cluster of sword-shaped leaves. A flower stalk grows from the center of the leaf cluster, bearing numerous drooping, bell-shaped flowers, white with a purple stripe. The leaves of the species *Yucca glauca,* found in the Rocky Mountains region and the Western plains, yield fibers used by the American Indians in making cordage, baskets and cloth.

YUCCA TREE
In the Mohave Desert.

There are several treelike forms, one of which is shown in the illustration; some of these produce wood of commercial value. The Mexicans use the juicy fruits of one species as food.

**YUKON RIVER,** the fifth largest river in North America and the greatest river both in Alaska and Yukon Territory. It rises in Canadian soil, but two-thirds of its course is in Alaska. Its total length, from its mouth to the headwaters of the Lewes, its chief tributary, is nearly 2,300 miles. This is as far as the distance between New York City and Albuquerque, N. M., or between Montreal and Calgary. Its drainage basin comprises 330,000 square miles, of which Alaska has slightly more than half. Not only is the Yukon River the

chief physical feature of the region, but it was, and still is to a degree, of the greatest economic importance.

It is navigable practically throughout its entire length. From its mouth to Dawson it is traveled by large steamers, and between Daw-

THE YUKON RIVER

son and White Horse Rapids by smaller vessels. Above the rapids is another navigable stretch about a hundred miles long. Many of the tributaries, including the Tanana and Porcupine, are also navigable for considerable distances. This network of 3,500 miles of navigable waterways made possible the rapid development of the gold fields, and is still a large factor in transportation, even though the rivers are frozen for eight or nine months of the year.

**Sources of the Yukon.** From Fort Selkirk, where the Yukon is formed by the confluence of the Pelly and Lewes rivers, to the headwaters of the Lewes is a distance of nearly 350 miles. The Lewes rises in a series of small lakes in the extreme northwest corner of British Columbia; its principal affluent issues from Lake Bennett, which lies partly in British Columbia, and partly in Yukon Territory. This lake is only twenty-five miles from Skagway, on Lynn Canal. From this point the Lewes and then the Yukon describes a vast, irregular, semicircular arc, ending on the west coast of Alaska.

**Four Divisions.** The valley of the Yukon proper, from the confluence of the Lewes and Pelly rivers to the mouth, may be divided into four physiographic divisions—the Upper Yukon, Yukon Flats, Rampart Region and Lower Yukon.

*Upper Yukon.* This section, extending from Fort Selkirk to Fort Yukon, at the confluence of the Porcupine with the main stream, is about 450 miles long. The Yukon, like the Lewes and most of its tributaries, has cut a channel from one to three miles wide and from 1,500 to 3,000 feet deep in the elevated plain or plateau which constitutes most of Eastern Alaska and the Yukon Territory. The principal tributaries of the Upper Yukon are the Selwyn, White, Stewart, Klondike and Forty-Mile. The first important discoveries of gold in this region were made on Forty-Mile Creek, but these were overshadowed a few years later by the richness of the Klondike field. At the junction of the Klondike River and the Yukon is Dawson, the capital and largest settlement on the river.

*Yukon Flats and Rampart Region.* After flowing northwest for 450 miles the Yukon turns almost at right angles and flows southwest for 200 miles through the famous "Flats." These are level areas of sand bars and low islands, covered with dense thickets of spruce. There the river channel is constantly shifting, and at seasons of high water increases in width from a normal of ten miles to forty, fifty or even a hundred miles. The "great bend" of the Yukon, where it receives the Porcupine River, is about three miles north of the Arctic Circle.

The "Flats" come to an abrupt end at the Ramparts, a splendid gorge which extends for 110 miles to the mouth of the Tanana River. In this part the Yukon Valley has an average width of one to three miles. The Tanana, which is the Yukon's largest tributary lying wholly in Alaska, flows northwest for about 400 miles, roughly parallel to and about 125 miles west of the Upper Yukon. The sources of the Tanana are glaciers in the Alaska Range.

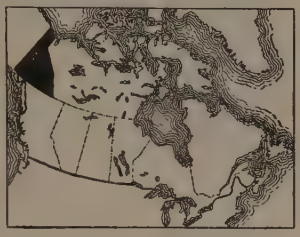
**Lower Yukon.** At the mouth of the Tanana River the Yukon gorge ends, and the river enters a lowland fifteen miles or more wide. From this point to the sea, a distance of 800 miles, the valley is never less than two miles wide, and the river has created many channels and small islands. Along the north side of the valley are ranges of hills or low mountains which extend to the delta. On the south side the hills extend to within a hundred miles of the delta, where they are merged into the coastal plain.

The Yukon delta covers nearly 9,000 square miles. There are about twenty-five outlets each not less than 600 feet wide, and numerous smaller ones. All of them, however, are shallow and are filled with sand bars. Steamers enter the delta by the arm known as the Apoon Pass, which is about four feet deep at low water. The sea for miles around is silted up, and ocean-going ships usually proceed to Saint Michael, seventy miles north, where they trans-

fer their cargoes to stern-wheel steamers which ascend the river. The rapidity of the current and the mass of water at low water—the discharge is at least 500,000 cubic feet per second —are responsible for the great amount of silt carried to the sea. W.F.Z.

**Related Subjects.** The list following the article YUKON TERRITORY is recommended.

**YUKON,** *u'kon,* **TERRITORY,** familiarly known as THE YUKON, the political division which occupies the northwest corner of the Dominion of Canada. On the south its boundary is the sixtieth parallel, dividing it from British Columbia. On the east and north are natural boundaries — on the east the summits of the Rocky Mountains, and on the north a narrow strip of the Arctic Ocean.



LOCATION MAP

The North West Territories of Canada adjoins the Yukon on the east, and Alaska, belonging to the United States, is on the west. The boundary between Alaska and the Yukon is the 141st meridian of west longitude.

Yukon Territory is roughly triangular in shape, its base being the British Columbia boundary, and its apex at the Arctic Ocean. Its area is 207,076 square miles, of which about 650 square miles are water surface. It is little more than one-third the size of Alaska, and is slightly less than the combined area of New Mexico and Arizona. Until the discovery of gold in 1896 this vast region was practically unpopulated, but in 1901 the census showed a total of 27,219 people. In 1911 the population was 8,512, a decrease of nearly seventy per cent. Dawson, the capital, and White Horse are the principal settlements.

**Physical Characteristics.** Practically the whole of the Yukon Territory falls within the Rocky Mountains, or Cordilleran, belt, but between the various mountain ranges are fertile plains and valleys. Only in the south do the mountains rise to great heights. There, almost on the Alaska boundary, is Mount Logan (see LOGAN, MOUNT), 19,539 feet high, the loftiest peak in Canada. A number of peaks in the vicinity are from 15,000 to 18,000 feet high. The Rocky Mountains, whose main chain forms most of the eastern boundary, is the watershed between the Yukon and Mackenzie rivers, but in places is scarcely more than a range of low hills. Considered as a whole, the surface of the Yukon is a rolling, elevated plain, from 2,000 to 3,000 feet above the sea, and broken by many river valleys and mountain ranges. The principal physical feature is the Yukon River, whose tributaries and branches penetrate almost every corner of the territory except the extreme southeast, which is drained by the Liard River into the Mackenzie River system.

**The Rush for Gold.** The importance of Yukon Territory may be summed up in a single word: gold. There are other mineral deposits, notably coal, iron and copper, but gold is by far the most important. For nearly half a century after 1840, when the first fur trader explored and named the Pelly River, a tributary of the Yukon River, practically the only people in the territory were traders and Indians. The first gold seeker crossed Chilkoot Pass in 1873 and important discoveries were made on Forty-Mile Creek in 1886, but the discovery of the marvelously rich Klondike fields in 1896 completely changed conditions. Forty thousand prospectors poured into the Klondike. Dawson was founded in the same year, local government was organized, and in 1898 the Yukon Territory was set apart from the North West. The Territory is governed by a commissioner, who is appointed by the Governor-General in Council, and he is assisted by a council, some of whose members are appointed and some elected. The territory has one representative in the Dominion House of Commons.

**Natural Resources and Future Possibilities.** At first all gold was taken by placer mining, but since the exhaustion of the rich placer deposits, hydraulic and vein mining have been the rule. The large capital required for these methods is chiefly responsible for the decline of the territory's population. The gold output reached its highest point in 1900, when the total amounted to $22,275,000, but it now averages about $5,000,000 a year.

Agriculture and manufacturing are also carried on, but only for local purposes. The climate is subject to wide extremes of heat and cold. The winter temperature is sometimes as low as 60° or 70° below zero. The summer is short, but the many hours of daylight, about twenty every day at Dawson, make it possible to cultivate garden vegetables. Most of the food required, however, is imported, and it is unlikely that agriculture will ever become a large industry. Formerly the imports were

transported in summer on flatboats which ascended the Yukon River, but now large quantities come by way of the Lynn Canal, Skagway and the White Pass & Yukon Railway as far as White Horse; from there steamers run down the rivers to Dawson. W.F.Z.

**Related Subjects.** The reader is referred to the following articles in these volumes:

| | |
|---|---|
| Alaska | Klondike |
| Dawson | Yukon River |

**YULE,** *yool,* an old name for Christmas. The term comes from an English word used to designate the two months of December and January, one of which was called the "former Yule," the other the "after Yule." In pre-Christian days in Scandinavian countries festivals were held at this turning point of the year, and these later became associated with the Christmas celebrations. Provincially, the word is still in good use in some places, but in general it is used only in such combinations as "yule log" or "yule cake," or to give a picturesque, old-time flavor to the Christmas idea.

**YUMA,** *yoo'ma,* a tribe of Indians belonging to the same family as the Mohave. When the early explorers entered their territory, on the Colorado River, below the mouth of the Gila, the Yuma was a large and progressive tribe. Its members were unusually fine looking and brave, but not inclined to be continually on the warpath, and they derived most of their living from their fields of corn and beans, pumpkins and melons. To-day there are about 800 of the tribe on the reservation of Fort Yuma, in the extreme southwestern part of California.

# Zz

Z is the twenty-sixth and last letter in the English alphabet. Like most of the other English letters, it was derived from the Phoenician, through the Greek and Latin. The Phoenician name for the character, which was the seventh in their alphabet, was *zayin,* meaning *dagger,* and the symbol was a rough sketch of the handle and part of the blade of that weapon. The Greeks called the letter *zeta,* and changed it to the form of the modern capital *Z,* and the Romans when they adopted it placed it at the end of the alphabet. It was only in the fifteenth century that the *zed,* as it was called, came to be used in English. Originally it was a compound sound, like *ds,* but has entirely lost that character and taken on the soft "buzzing" sound. In this value it is often replaced by *s,* as in *rose,* or by *ss,* as in *dissolve.* An old name for *z* is *izzard,* which is still commonly used in the expression "from A to Izzard."

**ZACATECAS,** *sah kah ta' kahs,* one of the most important mining centers of Mexico, and capital of the province of the same name, is situated in the central part of the country, 439 miles northwest of Mexico City (see map, *Mexico,* opposite page 3768). Zacatecas is built over a vein of silver in a narrow valley. It has various educational and religious edifices, a library, a mint, a cathedral, good residences and hospitals. The principal industry is the reduction of silver ore; the manufacture of pottery is also important. The city figured in the revolutionary disturbances during the years 1912 to 1916. Population in 1910, 25,900.

**ZAMBEZI,** or **ZAMBESI,** *zam ba' ze,* the fourth river of Africa in size, surpassed only by the Nile, the Niger and the Congo. It rises on the border between Belgian Congo and Portuguese West Africa, and follows a winding course through Rhodesia and Portuguese East Africa, emptying into the Mozambique Channel, an arm of the Indian Ocean (see map, *Africa,* opposite page 81). The total length of the stream is about 1,650 miles; it has many tributaries, and the area drained is about 500,000 square miles. The delta alone is several thousand square miles in extent.

The upper course of the river lies in level land where the water supply is dependent on equatorial rains, which fall from October to March. From the plateau it descends to a lower level by plunging over Victoria Falls (which see), a mighty cataract of greater volume than Niagara. The gorge below the falls is spanned by a magnificent bridge, the highest in the world, which is crossed by the Cape-to-Cairo Railway (see page 1170). The lower part of the river is navigable for about 400 miles from the sea, and a few steamers ply its waters, but as yet the river is of little commercial value on account of sand bars, rapids and shallows. It receives the drainage of Lake Nyassa, through the Shire River. The first European to visit the upper Zambezi, David Livingstone, explored that portion of the river in 1854 and 1855, and the *Livingstone* was the first steamer placed on the river above Victoria Falls; it was launched in 1902. Coal is found below the falls, and gold-bearing rocks occur in places along the river banks.

**ZANESVILLE,** *zaynz' vil,* Ohio, known locally as the *Clay City,* because of its extensive manufacture of pottery, is the county seat of Muskingum County, and is situated southeast of the geographical center of the state, on the Muskingum River, at the point where it receives the Licking River. Columbus, the state capital, is fifty-nine miles west, and Cleveland

is 147 miles north. Transportation is provided by the Baltimore & Ohio, the Pennsylvania, the Wabash and New York Central railways, and by interurban lines which operate north and south of the city. Zanesville was founded in 1799 by John McIntire and Jonathan Zane of Virginia. In 1802 a post office was established here and called Zanesville; from this the town received its name. It was the capital of the state from 1810 to 1812, but was not incorporated as a city until 1814. The population increased from 28,026 in 1910 to 30,863 (Federal estimate) in 1916.

Zanesville is distinctly a manufacturing city. It lies within a circle of hills in a region rich in coal, clay and limestone, and is crowded with industrial plants; cheap fuel, raw material and good water power from the Muskingum River provide exceptional facilities for manufacture. Although the foundries and machine shops have the largest output, the city excels all others in the United States in producing pottery, especially decorative tiles, about 2,000 people being employed in the tile plants. Paving blocks, agricultural implements, glass, leather, marble and lumber products are other articles of manufacture. Prominent buildings are a Federal building, erected at a cost of $150,000, a county courthouse, a Masonic Temple, an Odd Fellows' building and the Soldiers' and Sailors' Memorial Hall. The city has a Carnegie Library, a Roman Catholic academy and a home for children. R.B.B.

**ZANGWILL,** *sang'wil,* ISRAEL (1864- ), a British writer, of Jewish parentage, was born in London and educated at the Jews' Free School, Spitalfields, London. In 1888 he published a romance, *The Premier and the Painter,* and in 1892 appeared his *Children of the Ghetto,* the first of several works of fiction representative of Jewish life and character. Some of the later of these are *Ghetto Tragedies, They That Walk in Darkness* and *The Mantle of Elijah.* In *Dreamers of the Ghetto,* Spinoza, Heine and other Hebrew men of genius are portrayed. Others of his works are *Without Prejudice,* a collection of essays contributed to the *Pall Mall Gazette;* and *Merely Mary Ann* and *The Melting Pot,* plays that have been very popular. Zangwill has lectured in Ireland, the United States, Holland and Palestine, and is a leader of the Zionists (see ZIONIST MOVEMENT).

ISRAEL ZANGWILL

**ZANZIBAR,** *zahn zi bahr',* or *zan'zi bahr,* an island of East Africa, off the coast of German East Africa, under British protection, with an area of 640 square miles and a population of 197,000, including the island of Pemba, a part of the Zanzibar protectorate, which alone has 83,000 people. The island is nominally governed by a sultan, under the supervision of a British agent and consul-general. The present sultan, born in 1907, is sustained in his position by Great Britain.

The cocoanut palm flourishes, each tree yielding 100 to 120 nuts a year; but cloves and copra form the principal products, while tobacco and vanilla are also cultivated. The population is very mixed, a Bantu-speaking race being probably the original inhabitants; the people are noted as fishermen, cattle raisers and skilled artisans. Arabs, Parsis, Hindus, Swahili and natives of all parts of Africa are found in Zanzibar, while the white population numbers only about 250, mostly British. The port of Zanzibar is the only large town, with a population of 35,262. The dominant religion is Mohammedanism, but there are several Protestant and Roman Catholic missions on the island. Slavery was not abolished in Zanzibar until 1897, when compensation was given to slave owners. (See map, *Africa,* facing page 81.)

**ZEALAND,** or **SEELAND,** *ze'land,* in Dutch, *zah'lahnt,* the island on which Copenhagen, the capital of Denmark, stands. It is separated from Sweden by the narrow strait called the Sound, about ten miles wide; it is about fifteen miles east of the Danish island of Fyen. The island covers an area of 2,682 square miles, and has a very irregular outline, the rocky coast being indented by bays and fiords. There are several rivers, but the largest is only fifty miles long. Agriculture and cattle breeding are the principal occupations, the island being noted for its dairy products. The population, including the people on neighboring islets, is 960,053.

**ZE'BRA,** a group of horselike animals found wild in Africa, in the region between the Transvaal and Bechuanaland, in the south, and in the Sudan, in Egypt. They are distinguished from all other members of the horse family by their peculiar markings, parallel black stripes on a gray-white or cream-colored

ground, arranged in designs of almost geometric precision. These stripes run all over their bodies and up and down their faces, and meet diagonally down the sides of their head; stripes may appear even in their short manes and down their tails to the tuft of hair.

THE ZEBRA

See, also, other illustrations of the horse family, page 2841.

Not many years ago zebras roamed the plains of Southern Africa in great herds, but to-day they are much rarer, except in the wilder regions of the interior. There are three well-recognized species, differing slightly from each other in size and proportions, in color and markings. It is possible to train zebras to work in harness; but patience is required to accomplish this, for their wildness must first be subdued. They will not soon become as gentle as the horse, for they lack the thousands of years of domestication the latter animal has had.

**ZE'BU,** the general beast of burden of the Orient. Zebus are gentle and strong, able to travel thirty miles a day, and very useful for plowing and dragging. They have convex foreheads, drooping ears, short, backward-pointing horns and a huge, fatty lump on the shoulders. They may be larger than the European ox or as small as a mastiff. The usual colors are gray and cream, although red, brown, black and white zebus are often seen. Some white bulls, called *brahmany,* are held sacred by the Hindus and can roam at will, eating grain and vegetables from the fields or bazars. Zebus have been imported into Jamaica and Central America for use on banana plantations. (See illustration, page 419.)

**ZEBU,** one of the smallest of the Philippine Islands, forming part of the group between Luzon and Mindanao. It covers an area of 1,742 square miles, a little more than the area of Rhode Island. The surface is for the most part level and the soil is extremely fertile, sugar, cotton, hemp and rice being grown in large quantities. The capital, Cebu, is the oldest Spanish settlement and the second city in importance in the Philippines. In 1899 the island was occupied by the United States; in 1901 was given civil government as a province, the first of the islands to show itself possessed of the requisite degree of self-control. In the cathedral of the capital is preserved a cross said to have been erected by Magellan on his landing on the island in 1521. Population of the island province, in 1910, 592,247.

**ZEB'ULUN,** the name of the sixth son of Jacob and Leah, was given to one of the twelve tribes of Israel, and to a territory in Palestine. The territory of Zebulun lay in the northern part of the country, and within this district Jesus did most of His missionary work in the early period of His ministry.

**ZEDEKIAH,** *zed e ki'ah,* the last king of Judah, of the line of David. He broke his oath of allegiance to Nebuchadnezzar and joined the forces of Egypt against him. Jerusalem was captured by Nebuchadnezzar in 586 B. C., and the leaders of the Jews were taken captive. Zedekiah's eyes were put out, his sons were killed in his presence, and he was carried in fetters to Babylon, where he died. Two false prophets also bore the name.

**ZEIS'LER,** FANNIE BLOOMFIELD (1866- ), one of the foremost pianists of the present day, was born in Bielitz, Austria, but nearly all her life has been an American. In her second year her parents removed to Chicago, and she has since then made her home in that city. Her musical ability was so marked by the time she was eight years of age that she was placed under excellent instructors, and her musical education was completed by five years of study in Vienna. In 1885 she married Sigmund Zeisler, a prominent Chicago lawyer. Madam Zeisler has played before public audiences in the principal cities of Germany, France, Austria, England and America, and has everywhere won the praise of the severest critics for her mastery of technique and her marvelous gifts of interpretation. Her temperament and personal magnetism have also been factors in her successful career.

**ZEMSTVO,** *zemst'fo,* in Russia, a provincial or district legislative body which has limited powers over economic affairs. In a remote way it corresponds to the legislatures or assemblies of the states of the United States and the pro-

vincial assemblies of Canada, but its powers are much more restricted. There is a zemstvo for each elective district and for each province. Each is composed of a representative council and an executive board. Most of the members are elected by the householders in the towns and by the landed proprietors, but a few are appointed by the provincial governor to represent the peasants. The peasants may nominate candidates, but the choice lies with the governor, whose decision is final. This was the condition of affairs at the date of the revolution of March, 1917.

When the zemstvos were first established in 1864, they were given large powers over taxation, education, public health and other subjects of local importance. In 1890, however, the relative power of the landlords and nobility in the zemstvo was increased, the total number of representatives was reduced, and the peasants instead of choosing their representatives directly could merely suggest names from which the governor might select if he desired to. In spite of the fact that the zemstvos have gradually become little more than servants of the provincial governors, many of them have done much good, and have worked, in spite of difficulties, for the betterment of conditions affecting the mass of Russians.

**ZENANA,** *zeh nah'na,* the name given in India to that part of the house which is set apart for the women. The word is derived from the Persian, and is equivalent to the English *queen.* In Bengal the rules which govern the seclusion of women are very strict, and there the zenana is a separate building, to the rear of the one occupied by the men. It is built around a court, and upon this the windows look out. No glimpse of outside life is to be obtained by the inmates. In 1855 the Zenana Mission was organized by the Protestant missionary societies in India, and much has been done to better the wretched condition of the inmates of the zenanas, physically, mentally and spiritually. In Turkey a building used for like purpose is called a harem (which see).

**ZEND-AVES'TA,** the Bible and prayer book used by the Parsees, a religious sect of India which follows the teachings of Zoroaster (which see). The book is only a small part of the original sacred writings of the Zoroastrians, but is the only example we have of Iranian literature (see IRAN). It consists of songs of praise, prayers, the priestly code and the liturgy. The first translation of the Zend-Avesta was made in 1771 by Anquetil-Duperron, a French Orientalist. See PARSEES.

**ZE'NITH,** a term in astronomy denoting the point in the heavens directly over a person's head. It is the exact opposite of *nadir,* which is the point directly below one's feet, toward the center of the earth. The two words are derived from the Arabian language, the Arabians having at one time been the world's most famous astronomers.

*Zenith* is used in a figurative sense in literature, to denote the highest attainable point. Young, in *Night Thoughts,* aptly employs it in—

Brutes soon their zenith reach. In ages they no more
Could know, do, covet or enjoy.

**ZE'NO,** a Greek philosopher, born at Citium, in the island of Cyprus, who lived in the latter part of the fourth and the beginning of the third century B. C. He was the founder of the Stoic school of philosophy (see STOICISM). After a shipwreck he is said to have settled in Athens, though declining citizenship there through loyalty to his own country. Zeno was first attracted to the ethics of the Cynic philosophy, then turned to the teachings of Stilpo, to Xenocrates and to Polemo. About 310 B. C. he opened his own school, the Painted Porch, and there practiced the virtues of moderation and contentment and taught doctrines that bore a close resemblance to the principles of the Cynics. His death was honored by a public burial and a bronze monument, erected in Athens. None of his writings are extant. See CYNIC SCHOOL OF PHILOSOPHY.

**ZENOBIA,** *ze no'bi a,* called the "Queen of the East," was famed as the ruler of the rich and splendid ancient city of Palmyra, in the Arabian desert. She succeeded her husband Odenathus, in A. D. 267, and was a woman of great virtue as well as beauty, ruling with wisdom and tolerance. Her chief adviser was Longimus, the celebrated Greek philosopher and teacher. King Odenathus had pledged the loyalty of Palmyra to Rome, but Zenobia aspired to rule over an independent kingdom and she freed large Asiatic possessions from Roman domination. She successfully resisted the armies of two emperors, but was defeated by Aurelian in 272, and was taken to Rome to grace the victor's triumph. Her dignity, however, so impressed Aurelian that he gave her a villa on the Tiber, where she lived with her daughters, who made noble marriages. Her

descendants were prominent figures in the society of the capital for two hundred years. Palmyra, having revolted a second time against Aurelian, was destroyed by fire, and was never restored. See PALMYRA.

**ZEPHANIAH,** *zef a ni' ah,* a Hebrew prophet whose name has been given to the ninth book of the Minor Prophets. Presumably he lived and wrote during the reign of Josiah in Judah, but not even that much can be told of him with certainty. His little book, containing only three chapters in all, pronounces a doom on the world, and especially on Judah, for its idolatry, but closes with a more cheerful strain as the author sees beyond the punishment the happy state of those who have been purified and reunited with God.

**ZEPPELIN,** *tsep e leen',* FERDINAND, Count von (1838-1917), a German inventor, one of the foremost aëronauts of the world at the beginning of the twentieth century, was born at Constance, Baden. After serving as an officer of cavalry in the Franco-German war, he was promoted to the rank of lieutenant-general and was joined to the suite of the king of Württemberg. His early experiments with a dirigible balloon were successful, and in 1892 he made his first safe flight from Bern to Lucerne. The Zeppelin airship, in several models differing but slightly, has been used extensively for passenger service since 1910. Repeated experiments further perfected Zeppelin's skill, and in 1913 the seventeenth airship he had constructed, called the *Saxon,* made a trip from Baden-Baden to Vienna in about half the time required for the journey by train. The *Saxon,* carrying twenty-four passengers, covered a distance of 435 miles in eight hours. The *Zeppelin L-11* was constructed with the purpose of making an attempt to cross the ocean from Europe to America. On October 17, 1913, it was destroyed by an explosion in mid-air, entailing the loss of the ship's entire company, twenty-eight men.

Upon the Zeppelin airship the Germanic powers expected to accomplish great aërial enterprises in the War of the Nations, in long-distance trips to enemy countries on bombing expeditions and as naval scouts and convoys. While many of these expectations were realized, it was apparent late in 1916 that smaller, fleeter aircraft of the monoplane and biplane type were better adapted to almost all kinds of warfare, and the aged inventor died in the knowledge that successful conquest with his marvelous invention was impossible.

For extended description of Count Zeppelin's invention, see FLYING MACHINE, pages 2239-2240. Consult Hearne's *Zeppelins and Super-Zeppelins.*

**ZE'RO,** as used by the mathematician, represents nothing considered as a quantity. It denotes, in other words, the entire absence of a given quantity and is indicated by the symbol 0. In measurements, the zero of a scale is the starting point from which measurements are made. The zero found on the scale of the thermometer, it should be noted, is a little misleading. One might suppose that a body having 0 temperature had no heat; but such is not the case. Zero on the centigrade thermometer marks the freezing point of water, but scientists believe, from experiments conducted with gases, that a body absolutely without heat would have a temperature of about 273° below 0 on the centigrade scale.

**ZEUS,** *zuse.* See JUPITER.

**ZEUXIS,** *zuke'sis,* a celebrated Greek painter who flourished from about 420 B. C. to near the end of the century. He was born at Heraclea, and but little is known of his life. He excelled in the management of light and shade, and his art brought him great wealth as well as fame. So conscious was he of the value of his pictures that he preferred to present them to the cities expressing a desire for them, as he believed that no money could adequately pay for them. Among the most famous of his works are *Zeus Enthroned; Helen,* painted for the city of Crotona; *The Infant Hercules Strangling the Serpents,* and *Pan.* Zeuxis lived at the same time as a rival artist, Parrhasius (which see).

**ZINC,** *zink,* or **SPELTER,** a white metal with a bluish-gray tint. In appearance zinc resembles lead, but it is much harder. It is seven times heavier than water, and is so hard that a file acts upon it with difficulty. However, if heated to 250° or 300° it softens and can be rolled into thin sheets or drawn into wire. It melts at 773°. When slowly cooled it crystallizes in four- or six-sided prisms. When heated to a high temperature in air it burns with a white light, forming a white powder—zinc oxide.

Zinc always occurs in ores. The most important ores include the sulphide, or *sphalerite;* the carbonate, or *smithsonite;* the hydrate silicate, or *calamine;* the oxide, or *zincite.* Sphalerite, or zinc blend, is the ore from which the greater part of the zinc of commerce is obtained. Zinc ores are found in most of the countries of Europe, in Missouri, Kansas, New

Jersey and a number of other states in the United States, and in British Columbia. The Joplin district in Missouri is the chief center of zinc production in America, about sixty per cent of the entire output of the country coming from this district. The New Jersey mines are next in importance. The United States produces over 480,000 tons yearly.

Metallic zinc is obtained by roasting the ore, which sets the oxide free in the form of a white powder. The oxide is then heated with charcoal, the operation being conducted in earthen tubes or clay crucibles, which are connected with an iron receiver in which the powder finally condenses into a liquid.

**Uses.** In the form of sticks and plates, zinc is extensively used for the positive plate in electric batteries (see ELECTRIC BATTERY). Sheet zinc is used for lining tanks, and for protecting woodwork from heat when placed under stoves and on walls. Zinc is melted with copper to form brass and other bronzes and alloys, and is employed in the production of galvanized iron, which is made by dipping sheet iron in molten zinc. It is also used in the process of zinc etching (which see) for making plates used in the reproduction of drawings in printing.

**Zinc White.** Zinc white, a compound of zinc and oxygen, is a white powder extensively used in the preparation of a white paint for interiors. Zinc white is manufactured by roasting zinc ore and burning the vapor. The paint is prepared by grinding the powder in linseed oil. Zinc white makes a purer white than white lead, but it is not suitable for exteriors because it discolors on exposure to the weather.

**Other Compounds.** *Zinc sulphate,* or white vitriol, occurs in white crystals which change to powder when exposed to the air. It is used in calico printing and as a disinfectant in medicine. *Zinc chloride,* a compound of zinc and chlorine, is extensively used to preserve wood from decay. About 1,500 tons are used yearly for preserving railway ties. W.F.R.

Consult Ingalls' *Production and Properties of Zinc;* Holley's *Lead and Zinc Pigments.*

**ZINC ETCH'ING,** a process of making a plate for the reproduction of drawings and lettering. The drawing is made with India ink on white paper. A photograph on glass is made of the drawing. This photograph is clamped to a highly-polished plate of zinc which has been coated with wax or some other substance upon which acid will not act, and then coated with a sensitized solution similar to that used in making plates for use in cameras. The zinc plate is then subjected to electric light or to sunlight for a short time, and the pictures are transferred to the sensitized surface, which is etched as in the production of a halftone.

A zinc etching requires but a short time for production and is an excellent process for the reproduction of line drawings, but fine shadings cannot be reproduced. A print from a zinc etching consists of black lines interspersed with white spaces. For the reproduction of photographs and other pictures in which it is necessary to preserve the shading, one must resort to the halftone process or some modification of it. All the illustrations set into the printed pages of this work are from zinc etchings. The drawings were made in India ink, and were twice the dimensions of the completed pictures. See HALFTONE; PHOTOGRAPHY.

**ZINNIA,** *zin'ia,* a genus of plants belonging to the composite family, comprising about sixteen species. The zinnias are native to Mexico and the Southwestern United States, where they secure an abundance of warm sunshine. The

THE ZINNIA

best-known species—*Zinnia elegans*—is a garden plant that blooms in a wide variety of colors. It has a stiff, hairy stem which may reach a height of two feet. The flowers, made up of numerous florets, appear in various shades of red and yellow, including scarlet, crimson, pink, salmon and bronze, but the florist never knows whether these colors will be clear and brilliant or dull and blurred. This element of uncertainty in the flowering of the zinnia, in addition to its lack of fragrance, has detracted from its popularity.

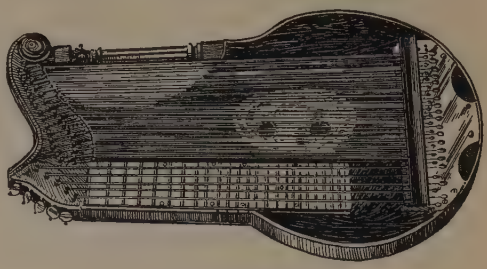
**ZI'ON.** See JERUSALEM.

**ZI'ONIST MOVE'MENT,** or **ZI'ONISM,** a project among present-day Jews whereby they aim to recover Palestine as a home for such members of their race as are persecuted or otherwise in distress among other nations. It was first advocated by Theodore Herzl of Vienna, and took form at an international congress held at Basel, Switzerland, in 1897. Herzl's plan was to obtain a charter from the sultan granting privileges to Jews settled in Palestine in return for the payment of an annual sum. Since Herzl's death, however, in 1904, and the changed régime in Turkey, this scheme has been abandoned, and Zionist activities have been directed towards developing the physical resources of Palestine and increasing Jewish influence in that land.

The first Zionist settlers were Russian and Rumanian Jews, who, like other pioneers, suffered many privations before their colonies became established. After a generation, however, it may be said that the efforts at a distinctively Jewish nation have been moderately successful. At the outbreak of the War of the Nations there were about forty self-governing colonies, ranging in population from a few families to 2,000 persons. Their organization is democratic, and women have equal rights with men. A guild of honor has been formed among the young men for the protection of their homes and crops against Arab outlaws. Crops of oranges, olives, grapes and almonds and even wheat have been raised and exported in considerable quantities. School and banking systems are well established, and the old Hebrew, long considered a dead language, has again been made a living tongue. The war brought complete cessation of business activity and much hardship to the Palestine Jews, but many throughout the world look to its close as the opportunity for the race to obtain the real right of possession in Palestine. Louis D. Brandeis (which see) is one of the promoters of Zionism in the United States. M.A.H.

Consult Joubert's *Aspects of the Jewish Question;* Waldstein's *The Jewish Question and the Mission of the Jews.*

**ZITH'ER,** a flat, stringed instrument with a wooden frame and flat sounding board. The instrument has from twenty-nine to forty-two strings. When in use it is either placed upon a table or on the knees; the strings are played by the right hand, and in order to bring out the melody more distinctly a metallic plectrum is fitted on the thumb. The zither, the successor of the ancient *cithara,* is popular among the peasants of Tyrol and of Southern Germany.



THE ZITHER

**ZODIAC,** *zo'di ak,* the name given to a zone among the stars extending 8° on each side of the ecliptic, or path of the sun. The name is derived from the Greek *zoön,* meaning *a living creature,* and nearly all the constellations in this zone are named after animals. From the earliest known times it has been customary to divide this zone into twelve portions, or periods. The Chinese divided the sun's course into twelve parts, and named the divisions Rat, Ox, Tiger, Hare, Dragon, Serpent, Horse, Sheep, Monkey, Hen, Dog and Pig. This same division was found among the Aztecs. Hipparchus was the first to divide the zodiac into twelve equal portions of 30° each, and his methods have remained in use to the present time. The idea of dividing the zodiac into twelve parts probably originated with the Chaldeans, and was suggested by the twelve reappearances of the moon during the year.

Egyptian astronomers adopted the Greek methods of division, but changed the signs of the zodiac to such living creatures as suited them. The signs now employed are also based on the Greek arrangement, and are as follows:

| | |
|---|---|
| Aries | (♈), the Ram, |
| Taurus | (♉), the Bull, |
| Gemini | (♊), the Twins, |
| Cancer | (♋), the Crab, |
| Leo | (♌), the Lion, |
| Virgo | (♍), the Virgin, |
| Libra | (♎), the Balance |
| Scorpio | (♏), the Scorpion, |
| Sagittarius | (♐), the Archer, |
| Capricornus | (♑), the Goat, |
| Aquarius | (♒), the Water bearer |
| Pisces | (♓), the Fishes. |

For descriptions of the signs and constellations, see articles relating to each; see, also, ASTRONOMY; ECLIPTIC; CONSTELLATION.

**ZODIACAL, LIGHT,** *zo di ak'al,* a cone-shaped glow of nebulous light seen after twilight in the evening, or just before twilight in

the morning, extending upward from the position of the sun. The light is brightest near the sun, and it shades off by almost imperceptible gradations. It was formerly supposed that this light was never visible except in or near the zodiac, and to this supposition the name is due. It is admitted that the light proceeds from a region surrounding the sun, but the actual cause of such light is still a matter unsettled by astronomers.

**ZO'LA,** in French *zo lah',* EMILE EDOUARD CHARLES ANTOINE (1840-1902), a French novelist, was born at Paris, and educated at Aix, Paris and Marseilles. Between 1859 and 1862 he was in extreme poverty, and several times close to the starving point. Early in 1862 he was glad to accept a position as a clerk at the equivalent of five dollars a week in a Paris publishing house, and while in this work he began to write. His first book, *Tales by Ninon,* appeared in 1864 and met with so little success that Zola almost despaired of making any headway in literature. In 1866, however, he bravely gave up his work as a clerk to risk writing for a living, and the next year his strong, stirring, but rather morbid, novel, *Thérèse Raquin,* won him fame and fortune. Like so many of his books, it dealt with the sordid and sinful life of the underworld of Paris.

EMILE ZOLA

He next undertook a truly immense task in telling in several volumes the story of an imaginary Parisian family of the middle part of the nineteenth century. He determined to show in detail and with unsparing realism how some of the family rose and how others sank, and throughout the series the world should be given such pictures of life in Paris as had never before been known. The entire work is known as *The Chronicles of the Rougon-Macquart Family,* and opens with a novel entitled *The Fortune of Rougon.* Others in the masterly series are *The Curée, The Conquest of Plassans, The Abbe Mouret* and *His Excellency, Eugène Rougon.* The entire chronicle can be compared only with another masterly French series, *The Human Comedy,* by Balzac. In 1877 Zola wrote *The Dram Shop,* a novel which so vividly described the consequences of drunkenness that all Europe was stirred by it. This was followed by such gloomy but powerful stories as *Nana; Paris,* dealing with the hidden life of the Parisian population; *Labor,* discussing the problems of the hand worker, and *Rome,* dealing with the Church.

**Estimate of His Work.** Zola must ever be considered one of the keenest observers in the world's ranks of writers; he seemed to know every phase of life and every motive back of a good or evil deed. He preferred to deal with the less noble qualities of men, their greed, their temper and their lust, and with such themes his stories sweep onward with a gloomy power like that of a dark, deep river. The usual lightness and daintiness of French authors he did not possess; the subjects are often too horrible for any fanciful playing with style. His chief defect is that he chose only one side of life to describe, the side found in the darker recesses of a great city; but the fact remains that what he tells about really exists as he pictured it.

**Champion of Dreyfus.** In January, 1898, Zola took an important part in the defense of Captain Dreyfus, a French Jew unjustly accused of selling military secrets to Germany. The novelist published a terrific denunciation of French government officials, entitled *I Accuse,* and late in 1898 he was forced to flee to England. The brave letter had much to do with freeing Dreyfus in June, 1899, after which event Zola returned to Paris. He lived in that city until his death, on September 29, 1902, which was caused by fumes from a defective flue in his bedroom. He was given a public funeral by the French government, and the famous French author, Anatole France, delivered at his grave one of the most eloquent orations of modern times.

Consult Matthews' *French Dramatists of the Nineteenth Century;* Vizetelly's *With Zola in England.*

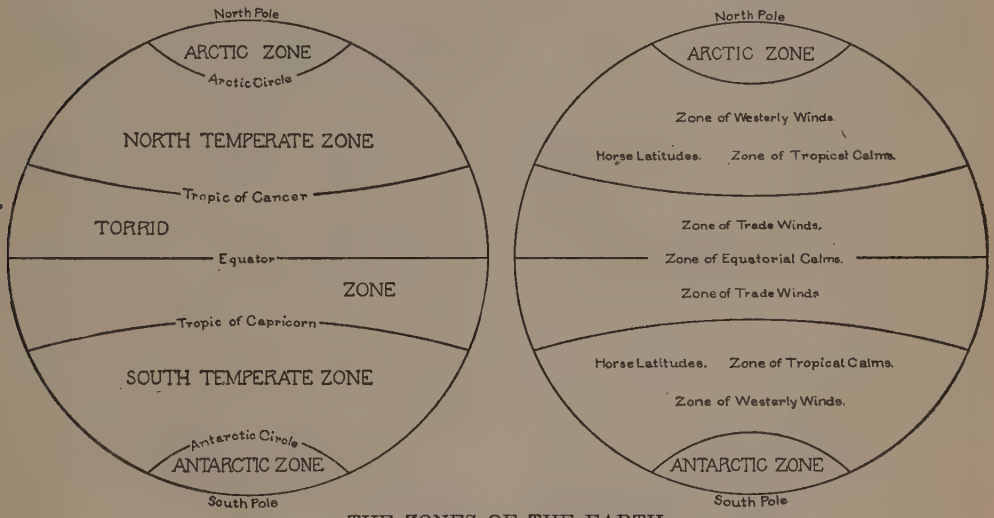
**ZOLLVEREIN,** *tsohl'fer in,* the German word for *customs union,* a term applied to the commercial union between Prussia and the other states of Germany which prepared the way for the political union we know to-day as the German Empire.

At the close of the Thirty Years' War Germany was nothing more than a collection of little states, each one glorying in its independence and striving to build up its own petty power without regard to national unity. Inter-

state trade, as well as commerce with foreign countries, was made difficult and complicated by the fact that each state had its own tariff system. Goods crossing the country would have to pay tolls every few leagues as the different state barriers were reached, and there was absolutely no uniformity in the scale of duties. This not only meant constant annoyance, but encouraged smuggling and hindered commercial growth.

Finally, in 1818, Prussia—the strongest of the German states—passed a law abolishing internal customs entirely, and establishing a common tariff to be collected only at the general frontier and divided among the states of the kingdom in proportion to population. Prussia invited the other states to adopt the same policy, and a number of them made compacts among themselves, resulting in the North German, the South German and the Middle German unions. In 1834 Prussia went still further and merged these three smaller unions into the great Zollverein which did so much to unify Germany. There was some opposition, largely from Austria and other states jealous of Prussia's growing power, but little by little the remaining states were drawn into the Zollverein, attracted by the great benefits of free trade. By 1866 it included practically all of the Germanic states except Austria, and began making commercial treaties with other countries. When the German Empire was established in 1871, at the close of the Franco-German War, its constitution provided that all of the Empire was to be included in the Zollverein, with the exception of the "free ports" of Bremen and Hamburg, but in 1888 they, too, were added, excepting certain parts of Hamburg.

**ZONE,** *zohn,* a subdivision of the earth's surface, particularly one of the five great climatic belts bounded by circles parallel to the equator. The largest of these is the torrid zone, which extends to 23° 30′ each side of the equator, its northern boundary being known as the Tropic of Cancer and its southern boundary as the Tropic of Capricorn. The most densely-populated belts are the north and south temperate zones, which are forty-three degrees in width and which extend from the tropics of Cancer and Capricorn to the Arctic and Antarctic circles, respectively. The two frigid zones are twenty-three and one-half degrees in width, the north frigid zone extending from the Arctic Circle to the North Pole and the south frigid zone from the Antarctic Circle to the South Pole. They are regions of eternal ice and snow, and very near the poles their year consists of but one night and one day, each six months in length. In the temperate zones, as one approaches the torrid realm, the days and nights during summer and winter become more nearly equal, and at the equator each consists of twelve hours. Although definite circles determined by astronomical conditions bound these zones, in temperature each merges gradually into the adjoining division, and no distinct climatic boundary exists.




THE ZONES OF THE EARTH
At left, the solar zones; at right, the climatic zones.

The winds of the earth are similarly divided into zones (see chart), and there are distinct realms of plant and animal life bounded by barriers of mountains and seas and conditions of climate.

On the basis of plant life the earth's surface is divided into the tropical zone, extending each side of the equator to the limit of frost, a region of tall, large-leaved plants and luxuriant vegetation except in the deserts; the temperate zones, lying between the limits of trees and frosts; the arctic zones, where there are no trees and little vegetation; the mountain zones, characterized by low-growing plants with proportionally large roots; and the water zone.

The animal zones include the arctic realm, characterized by few species of fish, mammals and insects and totally lacking in reptiles; the north temperate realm, which is subdivided into continental regions; the South American realm; the Indo-African realm, including a large part of Africa and Arabia, India, the southern part of Asia and the near-by islands; the Lemurian zone, comprising Madagascar alone and distinguished by many species of lemur; the Australian realm, including Australia and the neighboring islands, where the great part of the animals are marsupials and parrots. The sea is also divided into zones with respect to its animal life: the *littoral fishes* are those living near the shore; the *pelagic fishes* inhabit the surface waters of the open seas; the *bassalian fishes* are the simple forms of the deep sea. E.B.P.

**ZOÖLOGICAL,** *zo o loj'i kal,* **GARDEN,** an enclosure or a park where collections of live animals are kept for study and for exhibition. The animals are scientifically cared for, and many are provided with large, outdoor cages, where, so far as possible, they may live under natural conditions. The first collection of animals made for scientific study was that of the Jardin des Plantes, established at Paris in 1804. Owing to the rapid decrease in wild life and man's growing desire to learn more of animals, these institutions have been established in all parts of the world.

Among the leading zoölogical gardens in the United States are the gardens in Philadelphia and Cincinnati, and that in Bronx Park, New York City, which is partly maintained by the city. It is the largest and most complete zoölogical park in America; although controlled by the New York Zoölogical Society, the city has given the site, buildings, improvements, water and police service, and provides an annual fund for its maintenance. The National Zoölogical Park established in 1889 at Washington is maintained by Congress, under the direction of the Smithsonian Institution. It was given a fund of $100,000 in 1915.

In many of the large cities municipal "zoos," are maintained for free exhibition, the largest being those at Lincoln Park, Chicago; Highland Park, Pittsburgh; Forest Park, Saint Louis; Belle Isle, Detroit, and Golden Gate Park, San Francisco. In the cities of Ottawa, Montreal, Quebec, Toronto and in Stanley Park, Vancouver, similar collections are maintained, and in the western part of the Dominion there are large buffalo parks, such as that at Wainwright. In nearly every great city of Europe there is a zoölogical garden, and large institutions of this kind are maintained in Tokyo, Calcutta, Bombay, Melbourne, Rio de Janeiro and Buenos Aires.

Consult Hagenbeck's *Beasts and Men;* Velvin's *From Jungle to Zoo.*

**ZOÖLOGY,** *zo ol'o ji.* The great service of animals to man in furnishing him food and clothing, in the destruction of his enemies and as servants and companions has made them objects of universal interest. Public zoölogical parks, or "zoos," where wild and unusual specimens are exhibited, are thronged by people of all ages, and the interest in domestic animals is seen in the study given to their care and in the organization of humane

societies for their protection. This interest becomes even keener when we learn that a close relationship exists between animals and man. The study of the habits, structure and relationship of animals and their distribution over the earth has developed into a science, known as zoölogy. The name is derived from two Greek words meaning *animals* and *account*.

**Relationship.** Zoölogy is associated with botany in one great science, called *biology*, which embraces the study of all living things. It seems a simple matter to distinguish animal from plant life when we pass through a woodland filled with plants of many kinds and observe the squirrels and birds chattering in the trees, butterflies flitting from flower to flower, and rabbits and toads hopping across our path; but the simplest animals and plants possess so many characteristics of both forms of life that it is difficult if not impossible to tell which is plant and which is animal.

An even closer relationship than this exists between all animals. Man and the horse which bears his burden, the sheep, cattle, fish and birds which furnish him food, the insects which hide in the flowers of his garden—all the wonderful forms of animal life are descended from one simple organism.

**How Animals Survive.** The animals living to-day are the descendants of the hardiest of their species, which were so adjusted to the conditions of life about them that they were able to survive in the war with famine and death. They are especially adapted to the climate and geography of the locality in which they live; they are fitted to procure food; to maintain themselves among rival animals, and to defend themselves and their young. The divergence of species and classes is due to their adaptation to different environments, to heredity and to the survival of only the fittest species.

For self-protection animals are equipped with various weapons—horns, venom, claws, etc.—or they possess coats harmonizing in color with their surroundings, such as the white fur of the polar bear and arctic wolf, the spotted coat of the tiger, the changing color of the chameleon and of numerous small animals, birds, fish and insects. The greatest adaptation in appearance occurs among insects. Some, such as the dead-leaf butterfly and the green-leaf insect, are similar in shape, as well as in color, to the object upon which they live. Other species, which have no natural means of protection, mimic in color the more dangerous varieties of their kind, the mimicry being the result of a gradual development through a long line of ancestors.

As a means of protection, animals are also provided with special senses and instincts which are developed to different degrees of keenness in various classes.

**Division of the Animal World.** The great animal kingdom is divided according to general structure into the following subkingdoms:

The *protozoa* ("first animals"), such as the amoeba, the radiolaria and the infusoria.

The *coelenterata* (animals having hollow intestines), such as the jellyfish, coral and polyp.

The *echinoderms* (spiny-skinned animals), among which are the starfish, the sea urchin and the sea cucumber.

The *vermes*, or worms, limbless, creeping forms, like the earthworm.

The *mollusks* (soft-bodied animals), including the oyster, snail, cuttlefish and the like.

The *arthropoda* (jointed-foot animals), such as the spider, lobster, centipede and innumerable forms of insects.

The *vertebrates* (backboned animals), including man and the other mammals; birds, amphibians, fish and reptiles.

These subkingdoms are divided into *classes* according to certain physical distinctions, such as hair, feathers, scales, etc., and each class is made up of a number of *orders*, which include various *families*. The latter division, as, for example, the cat family, includes many *genera* (plural of *genus*), such as the lion, the lynx and the domestic cat, and each genus embraces many species. See CLASSIFICATION.

**History.** With childish delight and credulity, the ancients treasured legends of strange animals of distant lands and the deep seas, and in fable they attributed marvelous characteristics to them. Many of the tales of this legendary period were later confirmed by travelers and navigators, who brought back from their journeys specimens which proved their reports. These early collectors founded the ancient study of zoölogy, which was merely a description of different animals which were thought to be entirely unrelated.

The earliest scientific investigator into animal life was the Greek philosopher Aristotle, who lived 350 years before Christ. He dissected various animals and made a classification of the known species. Until the sixteenth century, the knowledge of animal structure went no deeper than the views of Aristotle, but in the new age, when the whole civilized world had awakened to a spirit of discovery and exploration, the scientific development of zoölogy began. The inquiry into the relation of

man to the higher animals was started in the medical schools in the study of anatomy. The discovery of the microscope at the end of the century made possible the great advance of the next hundred years, which culminated in the eighteenth century in the work of Linne (which see), who made the first systematic classification of species.

Among the many scientists who contributed important discoveries to zoölogy only a few of the most prominent can here be mentioned. At the end of the eighteenth century, Lamarck regrouped the animals and made the distinction between vertebrates and invertebrates, and Cuvier, by showing that the parts of different animals were fundamentally the same, firmly established the study of comparative anatomy. The perfection of the microscope at this time revealed that animal bodies are composed of cells of living matter, called protoplasm, and that all organisms begin their existence as a single cell in the egg.

The last element of mystery was banished from the science of zoölogy when Charles Darwin, in 1859, published his theory of organic evolution—the theory that all animals have developed from the same primitive form, the different types being due to modifications caused by adaptation to environment, heredity, and the struggle for existence. The discoveries of many new animal forms and relationships made since that time have further strengthened Darwin's theory. E.B.P.

Consult Locy's *Biology and Its Makers;* Lankester's *Treatise on Zoölogy;* Shipley and MacBride's *Zoölogy.*

**Related Subjects.** The following list of articles in these volumes dealing with zoölogical subjects includes only those which cover the more general phases of the subject. The forms of animal life described are too numerous to be listed here, but if the reader will consult the indexes given with many of the following articles he will find all the important animals listed and classified:

Amphibians (with list)
Animal (with list)
Arachnida (with list)
Arthropoda (with list)
Batrachia
Bird (with list)
Carnivorous Animals (with list)
Cephalopoda
Cetacea (with list)
Chiroptera
Coelenterata
Crustaceans (with list)
Echinoderms (with list)
Edentata
Egg
Entomology
Feathers
Fish (with list)
Hemiptera (with list)
Hibernation
Horn
Infusoria
Insect (with list)
Insectivora
Invertebrates (with list)
Larva
Lepidoptera
Mammals (with list)
Marsupials (with list)
Metamorphosis
Mollusks (with list)
Molting
Myriapoda
Neuroptera
Ornithology
Orthoptera (with list)
Primates (with list)
Protective Coloration
Protozoa (with list)
Radiolaria
Reptiles (with list)
Rodents (with list)
Ruminants
Scales
Shell
Ungulates (with list)
Vertebrates (with list)
Vorticella
Worms (with list)
Zoölogical Garden

MISCELLANEOUS

Cell
Classification
Cuvier
Darwin, Charles
Evolution
Lamarck, Jean Baptiste
Linne, or Linnaeus
Protoplasm

**ZORN,** *tsohrn,* ANDERS LEONHARD (1860- ), a Swedish painter and etcher, born at Mora, of peasant parents. He studied at the Academy of Fine Arts in Stockholm, and by the time he was of age had earned enough by portrait painting to enable him to travel in Italy, Spain and England. For a time he lived in London, learning there the art of etching, and in 1889 he removed to Paris. His success has been constant, whether he attempts portraits or landscapes, marine or genre paintings, and he has received several medals. Almost all of the Swedish royal family have been painted by him. His best known paintings include *Irish Maidens, Italian Street Scene, Summer in Sweden* and *A Toast.*

Zorn ranks with the greatest etchers of all time—with Rembrandt, Meryon and Whistler. Some of his etchings are copies of his own paintings, but more of them are original. His portrait etchings alone make him a great artist—they include sketches of Ernest Renan, Auguste Rodin, Grover Cleveland, John Hay, Theodore Roosevelt and William H. Taft.

**ZOROASTER,** *zo ro as' ter,* a Persian reformer and teacher, the founder of an ancient religion, whose origin and life are veiled in the dim light of early ages. History cannot fix the date of his birth or of his death; in fact, ancient records speak of several philosophers, of different nationalities, all known by this name. But the great teacher probably was a native of Bactria, one of the provinces of ancient Persia. The age in which he lived is also a mooted point, ranging from 2400 to 600 B. C. A number of eminent scholars assert that he could not have lived at a date later than 1000 B. C.; others equally well informed think the Zend-Avestas, containing his teachings, are not, at most, earlier than the seventh century B. C. Probably the dates of his birth and death which are most relied on by scholars are 660-585 B. C.

Every religion that has influenced the world has centered around an individual, but individuals have not created religious systems. Their task has always been to simplify, arrange and spiritualize a confused mass of earlier teachings.

**Zoroastrianism.** The ancient religion of the Persians was Mazdaism; the reforms and spiritualized teachings imparted by Zoroaster and his followers changed it to Zoroastrianism. All nature seemed to the ancient Persians to teach dualism. There is cold and heat; light and darkness: hence, also good and evil. Zoroaster taught that all forms of life and all forms of creation are the resultant of two principles, forces or tendencies; their names, as given in the Zend-Avesta, are simply *better principles* and the *worse one,* but these principles soon become personalized as Ahura Mazda and Angra Mainyu, and later still as Ormazd and Ahriman. The practical consequence of this belief was a division of everything between these two principles; all supernatural powers were ranged on the side of good or evil. The great duty of man in this life is to choose the Better Way, "as to thought, as to word, and as to deed." But these teachings were too refined for the mass of the people, and ancient polytheism resumed its sway.

There are striking resemblances in ancient beliefs as well as wide differences, and there are parallels with some of the teachings of more modern religions. Zoroastrianism taught that there were abodes of the blest and the wicked after death; the House of Hymns corresponded to the Christian heaven, while the House of Destruction was the Zoroastrian hell. Between the two the Judge, or Gatherer, stood and separated the righteous from the wicked. The teachings of this religion prophesied the coming, at an uncertain day, of a Savior (Saoshyant) and the approach of a final judgment upon all men. A.MC C.

Consult Jackson's *Zoroaster, the Prophet of Ancient Iran;* Tiele's *The Religion of the Iranian Peoples.*

**ZOUAVES,** *zoo ahvz',* a body of troops in the French army, deriving the name from the *Zouaoua* tribes of Kabyles of Algeria, from whom they were first recruited in 1830. When first raised the Zouaves consisted of two battalions composed of an equal number of French and natives. It was found undesirable to continue this formation and the races were separated, the French portion continuing, however, to wear the native dress they had adopted. The native Algerian contingents are known as *Turcos.* The Zouaves now in the French army consist of four regiments of five battalions each and are considered one of the finest bodies of infantry in Europe.

In the United States the Zouave uniform became popular during the War of Secession, the Ellsworth Zouaves and the New York Fire Zouaves being conspicuous for bravery.

**ZUIDER ZEE,** or **ZUYDER ZEE,** *zi'der ze',* a gulf projecting into the Netherlands and separated from the North Sea by a chain of islands. Originally the Zuider Zee was a lake in the midst of extensive fens and marsh lands; it acquired its present character as a result of inundation occurring from the twelfth to the fifteenth century. It is extremely shallow, having an average depth of from ten to forty feet. Its greatest length, which is from north to south, is eighty-five miles; it has a maximum breadth of forty-five miles and an area of a little over 2,000 square miles.

**ZULULAND,** *zoo'loo land,* a territory of Africa, forming the northeastern portion of the Province of Natal, in the Union of South Africa. It covers an area of approximately 10,450 square miles, stretching from the lower Tugela River to the boundaries of Portuguese East Africa. The population is estimated at 230,000, of whom only about 1,700 are white.

The Zulus have long been noted as fierce warriors, which fact has brought them often into prominence and made them better known to the world than any other black tribes of the "Dark Continent." Early in the nineteenth century they overran great portions of South Africa, and have been until comparatively recent years bitter opponents of the Boers, who inflicted terrible defeats on the Zulu hordes, though outnumbered by nearly twenty to one. The Zulus, part of the original African Bantu stock, reside in *kraals,* or villages, which they build as circular enclosures, with a second inner ring fence, forming a cattle pen. Over each kraal was formerly a head man subject to the authority of the chief of the tribe, who was himself responsible to the king. The highest authority is now exercised by a resident British commissioner. The last Zulu king was Dinizulu, son of the famous Cetewayo, whose royal kraal was at Ulunde, where he was crushed after severe fighting in 1879. The Zulu power was broken, but Dinizulu continued to incite the natives against Boers and British, and he was eventually banished. Zululand was annexed to Natal in 1897.

Zulus are noted for their fine stature and for their high moral code. Under despotic rulers in the nineteenth century immorality was punishable by death, but the abandonment of military organization has tended to lower the moral and military standard. The climate of the region occupied by them is fairly healthful, but is subject to contrasts of heat during the day and to severe cold at night. Well-made roads provide means of internal communication, and there is fairly good anchorage for vessels at Port Durnford, on the Indian Ocean.

**ZULUS,** *zoo'looz,* the inhabitants of Zululand, a territory in South Africa. These people are described under the heading ZULULAND.

**ZUÑI,** *zoo'nyee,* the popular name of the oldest and most important tribe of Pueblo Indians (see PUEBLO). They live in a single permanent pueblo, or village, situated in New Mexico, and known as Zuñi. In summer the tribe also occupies the three neighboring villages of Pescado, Nutria and Ojo Caliente. The Zuñi Indians have lived in the same narrow valley for many centuries; the Spanish invaders found them there when they came in 1539, and the Zuñis have not left the place since. They are a self-supporting people, cultivating the ground, and raising small herds of cattle, sheep and donkeys.

In the center of the Zuñi town is a wide court, which the people reach by climbing many ladders to the top of the pueblo, and then climbing down many more to the ground. The houses are entered from the roof, and the interior is reached by climbing up one ladder and down another. When a Zuñi wishes to lock up his house he simply pulls up his ladder. In 1910 these Indians numbered 1,667. A white man, Frank H. Cushing, lived among the Zuñis for several years and was adopted by the tribe. His account of their history, manners and customs is the most accurate ever written on the subject.

**ZURICH,** *zu'rik,* a manufacturing city and noted educational center of Switzerland, situated at the northern end of a lake which bears the same name. It is the capital of the canton of Zurich, and is the largest city of the republic. The old city, with its steep, narrow streets and old-fashioned houses, has a quaintly medieval aspect, but the newer sections are modern in every respect. The Limmat, which flows through the middle of the city and divides it into two parts—the Little City and the Great City—is crossed by eleven bridges. Among the noteworthy edifices are the National Museum, with many relics commemorating the history of the republic; the Municipal Library, which, in addition to its 170,000 volumes and numerous manuscripts, contains a collection of portraits and busts of celebrated citizens; the Romanesque cathedral, dating from the eleventh century, of which Zwingli, the famous Swiss reformer, was pastor, and Saint Peter's Church, interesting because of the tomb of Lavater, a celebrated preacher. The university, or Polytechnicum, founded in 1832, is the most celebrated institution for higher learning in Switzerland. Zurich has many other excellent schools and an interesting botanical garden. Silk, cotton goods and machinery are among the manufactures. Population in 1913, estimated, 205,000.

**ZURICH,** LAKE, one of the beautiful lakes of Northern Switzerland, lying in a deep valley, principally within the canton (state) of Zurich. The lake has somewhat the shape of a crescent, and is about twenty-five miles in length and from about one-half to two and one-half miles in width. It is spanned by a beautiful bridge, which serves as a delightful promenade. Palatial hotels afford accommodations for thousands of tourists.

**ZUYDER ZEE,** *zi'der ze'.* See ZUIDER ZEE.

**ZWINGLI,** *tsving'li,* ULRICH (1484-1531), a Swiss reformer, the contemporary of Martin Luther and the leader of the Protestant Reformation in his country, was born at Wildhaus, a canton of Saint Gall. After studying at the University of Vienna and at Basel he became parish priest at Glarus, a position which he held for ten years. Entering foreign service as a field chaplain, his experiences soon convinced him that the prevailing kind of army life was ruinous to the best youth of the country; his protests, however, met with so much opposition that he was forced to leave Glarus.

At Einsiedeln, a celebrated center of pilgrimage, Zwingli first began to make public his ideas of reform, and upon being called to Zurich in 1519 as "priest of the people," he laid the foundations for the reformation of the Church, its doctrines and its external ceremonies, which he undertook to carry out. Zwingli definitely opposed Papal power in 1520, when he offered a public exhortation to his people to support the stand that Martin Luther had already taken, and presented definite measures of reform. All of Switzerland, except the outlying forest cantons, where Catholicism was most firmly grounded, soon rallied to his support. In certain matters of faith, Luther

and Zwingli never wholly agreed, and a complete union of the reformers fell through at a conference at Marburg in 1529, called for the express purpose of uniting the differing factions. Lucerne, Unterwalden, Zug, Schwyz, and Uri—all strong Catholic cantons—rose in open warfare against Zwingli in 1531.

Convinced that without a strong confederation nothing by way of reform of religion could be effected, Zwingli himself entered upon the battle field of Kappel as field chaplain, and there met his death. His forces suffered defeat in the second encounter, and with it all hope of uniting the Catholic and Protestant cantons was destroyed. Fundamentally, Zwingli was a man of peace, and with a clear vision aimed to oppose fanaticism and internal abuses of the Church, constantly maintaining his ideal of a pure and simple form of Christianity. His life and achievements have been adequately treated by many writers.

Consult Jackson's *Heroes of the Reformation;* Simpson's *Life of Ulrich Zwingli, the Swiss Patriot and Reformer.*

# *FINDING LIST OF TOPICS*

## *An Alphabetical Index*

It has become the habit of users of reference works to seek for information only under the regular alphabetical arrangement of black-type headings. If a word sought is not thus found, it is assumed that nowhere in the set of books is there any important reference to it. This is usually a false conclusion, yet the seeker after information is helpless; he does not know where in his books the facts he needs may be hidden, and the publishers have adopted no method of enlightening him.

It is neither desirable nor possible to give separate articles, under a black-type heading, to thousands of minor topics. Many of them are purely dictionary terms; others are not of sufficient importance to merit extended treatment. However, nearly all subjects of this nature are mentioned in connection with the discussion of other topics, and an Index which will reveal their location will easily double the value of any reference work.

It is possible to carry such an Index, or Finding List, to an extreme where its usefulness will rapidly decrease. A *concordance,* or list of all leading words used, must be avoided; unless some bit of valuable information is given there is no necessity for reference.

The legitimate uses of a Finding List may be briefly illustrated. A person may find in a paper or magazine something about the *ricebird;* he turns to his encyclopedia and fails to find an article relating to it. The omission is entirely proper, for the name *ricebird* is locally employed; a thorough, carefully-made Index will refer to the article BOBOLINK. Naturally the term *light years* will not be the subject of a special article. Where, then, should the person turn who needs quickly an explanation of it? The word *pepper-grass* may become of interest; the properly-prepared Index identifies it at once. Instances of the usefulness of such an Index might be multiplied endlessly.

The following Finding List of The World Book has been prepared with the purpose of bringing to usefulness many thousands of topics hidden away in the text of other articles. No word has been included unless some fact of importance is printed concerning it. To facilitate the locating of any word or phrase sought, the letters *a, b, c, d* are employed immediately after page numbers to indicate the first, second, third and fourth quarters of the page — *a* and *b* the top and bottom halves of the first column on the page, and *c* and *d* the top and bottom halves of the second column. Thus, the person who sees in the Finding List *Water-bound macadam, 5029b,* knows that that subject is described on the lower part of the first column of the page named.

We believe no simpler or more effective designation could have been adopted. The usefulness of The World Book will be increased in the hands of any owner to the extent that he makes demands upon the pages which follow.

# FINDING LIST OF TOPICS

## A


A, 1a.
A 1, 1a.
Aachen, 122d.
Aard-vark, 1b.
Aard-wolf, 1d.
Aarhuus, Denmark, 2a.
Aaron, 2b.
Aar River, 4994a.
Abaca, 4632b.
Abacus, 2b, 1507d.
Abalone, 2d, 5344d.
Abbas Hilmi, 1970d.
Abbess, 3d.
Abbey, 3a.
Abbey, Edwin Austin, 3c.
Abbot, 3c.
Abbotsford, 3d, 5267b.
Abbott, Emma, 4578c.
Abbott, Jacob, 3d.
Abbott, Lyman, 4a.
Abbott, Sir John Joseph Caldwell, 4b.
Abbreviations, 4c.
A B C powers, 1335c, 3774a, 6306a.
Abdication, 7a.
Abdomen, 7b.
Abduction, 8a.
Abd-ul-Hamid II, 8a, 1556b.
Abd-ul-Medjid, 8a.
A Becket, Thomas, 643c.
Abel, 8c.
Abelard, Pierre, 8c.
Abercrombie, James, 8d.
Aberdeen, John Campbell Gordon, 9b.
Aberdeen, Scotland, 9a.
Aberdeen, S. D., 9c.
Aberdeen, Wash., 9d.
Aberdeen-Angus cattle, 1237b.
Aberration, 10a.
Abib, 4240d.
*Abide With Me*, 2895c.
Abilene, Tex., 10b.
Abimelech, 3068d.
Abiogenesis, 5507d.
Abitibi River, 3944d.
Abnaki Indians, 199b.
Abolitionists, 10c.
Abomey, West Africa, 10d.
Aborigines, 10d, 483b.
Aboukir, Egypt, 11a.
Aboukir Bay, Battle of, 4114a.
Abraham, 11a, 3068d.
Abrogation of treaties, 5869b.
Abruzzi, Prince Luigi Amadeo, 11b.
Absalom, 11c.
Abscess, 11d.
Absecon Beach, 4163b.
Absent-mindedness, 5598a.
Absinth, 12a, 4835b.
Absinthol, 12b.
Absolute monarchy, 3882c.
Absolute pardon, 4492b.
Absolute veto, 6074d.
Absolute zero, 5745a.
Absolution, 12b.
Absorption, 12c.
Absorption spectrum, 5489a.
Abstinence, 2140b.
Abstinence theory of interest, 3011d.
Abstraction, 5799b.
Abstract nouns, 4294a.
Abstract of title, 1738d.
Absyrtus, 3715c.
Abt, Franz, 13b.
Abu, Mount, India, 4925d.
Abu-Abdullah, 784d.
Abubekr, 3276c.
Abukir, Egypt, 11a.
Abu Talib, 3871d.
Abutilon, 13c.
Abydos, Egypt and Asia Minor, 13d.
Abyla, 2781b.
Abyssinia, 14a.
Acacia, 17d.
Academus, 18b.
Academy, 18b.
Academy of Natural Sciences, 18c.
Acadia, 18d, 2330c, 4296a.
Acadia University, 19a.
Acadie, 4296a.
Acanthus, 19b.
Acapulco, Mexico, 19c.
Acarnania, 318a.
Accad, 532c.
Accelerated velocity, 6046b.
Acceleration, 2133a.
Accent, 19d.
Accent in foreign words, 4840c.
Accessory, 20a.
Accidental President, 5923d.
Accidentals (in music), 4028c.
Accidents in mines, 3822b.
Acclimatization, 20b.
Accolade, 1358b.
Accommodation (eye), 2119c.
Accordion, 20d.
Accountant, 21a.
Accounting, 20d.
Acerbas, 1794c.
Acetanilid, 22a, 2740a.
Acetic acid, 22b.
Acetylene, 22c.
Achaea, 23d, 318a.
Achaean League, 24a.
Achaia, Greece, 1579d.
Achates, 24a.
Achelous River, 2604c.
Acheron, 24a.
Achilles, 24b, 5888a.
Achroite, 5849a.
Acid, 24c.
Acknowledgment, 1738d.
Aclinic line, 25a.
Acoma Indians, 3749a.
Aconcagua, 25b.
Aconite, 25b.
Acorn, 25b, 4322d.
Acoustics, 25c.
Acre (Syria), 25d.
Acre (land measure), 25d.
Acrisius, 4591c.
Acropolis, 26a, 452b, 454c, 2607c.
Acrostic, 26b.
Actaeon, 26c.
Acting a moving picture play, 3988c.
Action, 6287c.
Action, Deliberate, 6287a.
Action, Impulsive, 6286d.
Actium, 26d.
Actium, Battle of, 1417b.
Active attention, 467b.
Active voice, 6110a.
Active volcano, 6111d.
Act of Settlement, 2587a.
Act of Union, 2587a, 5262c.
Acton, John Emerich Edward Dalberg, 27a.
Acts of the Apostles, 27a.
Acute angle, 255d.
Acute triangle, 5876a.
Adagio, 4026a.
Adam and Eve, 27b.
*Adam Bede*, 2010d.
Adams, Abigail Smith, 33a.
Adams, Charles Francis, 27c.
Adams, Charles Kendall, 27c.
Adams, Frank Dawson, 27d.
Adams, John, 28a, 1735d.
Adams, John Couch, 4117c.
Adams, John Quincy, 33b.
Adams, Mass., 39a.
Adams, Maude Kiskadden, 38d.
Adams, Mount, 1212b, 4403d.
Adams, Samuel, 38d.
Adams, Sarah Flower, 2895d.
Adams, William Taylor, 4371a.
Adam's ale, 173d.
Adam's apple, 39b.
Adam's needle, 6403c.
Adamson railroad law, 1974b, 2521b.
Adams Peak, 1258a.
Adaptation theory, 1706a.
Adaptation to environment, 2060c.
Addams, Jane, 39b.
Addax, 39d.
Adder, 40b.
Adder's tongue, 1830c.
Adding machine, 40c, 1049a.
Addis Abeba, 40c.
Addison, Joseph, 40d.
Addition, 41a.
Addition in algebra, 190a.
Addition of compound denominate numbers, 1767b.
Addition of fractions, 2284b.
Address, Forms of, 51c.
Ade, George, 52a.
Adelaide, Australia, 52b.
Adelaide of Lombardy, 4425c.
Adeler, Max, 1407c.
Adélie Land, 4728c.
Aden, Arabia, 52c, 309b.
Aden, Gulf of, 53a.
Adenoids, 53a, 1945d.
Ader, Clément, 2237c.
Adhesion, 53c.
Adhumbla, 4043a.
Adige River, 53d.
Adighes, 1385b.
Adipose tissue, 5818c.
Adirondack Mountains, 53d, 4195d.
Adirondack Mountains tuberculosis colony, 5896b.
Adjective, 54b.
Adjutant, 56c.
Admetus, 165c, 3744a.
Administration of public schools, 5239b.
Administrative law, 3349d.
Administrator, 56d.
Admiral, 57a, 4929a.
Admiralty, 57c.
Admiralty Inlet, 4866a.
Admiralty Island, 58a.
Admiralty law, 57d.
Admission of states, 5973c, 5992a.
Adobe, 58a, 3766d.
Adolescence, 58b.
Adonai, 3136d.
*Adonais*, 2004d.
Adonijah, 5434d.
Adonis (plant and myth), 59c.
Adoption (law), 59d.
Adoption of the Constitution, 1560d.
Adrar, 84b, 5476b.
Adrian (Popes), 59d.
Adrian, Mich., 60a.
Adrianople, Treaty of, 3598b.
Adrianople, Turkey, 60b.
Adriatic Sea, 60c.
Adulteration of foodstuffs and clothing, 61a.
Adulteration of seed, 5291d.
Ad valorem duties, 1677c.
Adventists, 64b.
Adventitious roots, 5078c.
Adverb, 64c.
Advertising, 66d.


The letters a, b, c, d, following page numbers indicate first, second, third or fourth quarters of page.

Advertising agencies, 67d.
Advertising kite, 3263c.
Adz, 70d.
Aeacus, 4991b.
Aedico, 4343a.
Aegean Sea, 70d.
Aegina, 71a, 4586a.
Aegis, 71b.
Aegisthus, 4411b.
Aegospotamos, 4555b.
Aelia Capitolina, 3142c.
Aelian's wart hog, 6184d.
Aeneas, 71b, 5888b.
*Aeneid*, 71b, 6061b.
Aeniania, 318a.
Aeolian harp, 71d.
Aeolians, 72a, 2600d.
Aeolus, 72a, 4343c.
Aequi, 3342c.
Aerated bread, 909c.
Aerial bombardment, 803c.
Aerial cable, Niagara, 4225a.
Aerials, 6322d.
Aeroplane, 2236a.
Aeroplane signaling, 5377b.
Aeschines, 72b, 1755a.
Aeschylus, 72b.
Aesculapius, 73a.
Aesop, 73b.
Aesop's *Fables*, 73a.
Aesthetic myths, 4051a.
Aetius, 6021a.
Aetna, 2085c.
Aetolia, 318a.
Affidavit, 73b.
Affinity, 73c.
Affirmation, 4326a.
Affray, 5023d.
Afghanistan, 73d, 412b.
Afghans, 75b.
Afghan War, 2949b.
Africa, 76a, 6154a.
African explorations (Roosevelt), 5074b.
African Methodist Church, 89b, 3756d.
African Methodist Episcopal Zion Church, 89b.
African oak, 5727a.
African teak, 5727a.
Africanus Major and Minor, 5255a.
After damp, 2180c.
Afternoon dress, 5327d.
Agamemnon, 89b, 5887d.
Agana, Guam, 2630b.
Aganippe, 89c.
Agaric (mushroom), 4014b.
Agassiz, Alexander, 90a.
Agassiz, Lake, 3627a, 3828c, 4954c.
Agassiz, Louis John Rudolph, 89c.
Agassiz Association, 90a.
Agate, 90b, 4886d.
Agate burnisher, 1354d.
Agate type, 68d, 5930d.
Agave, 1255a, 3768b, 4868b.
Age, 90d.
Agent, 91a.
Age of Chaucer, in literature, 2053d.
Age of Fishes, 1781a.
Age of Ice, 2499a.
*Age of Innocence*, 4450.
Age of Man, 2868d.
Age of Pericles, 4585d.
*Age of Reason*, 4446c.
Age of trees, 5871b.
Agglutinative languages, 4640c.
Agha Mohammed, 4595b.
Agincourt, 91b.
Aglaia, 2548d.
Agle, 2788a.
Agnes of Meran, 4628d.
Agnostic and agnosticism, 91b.
Agomska Island, 3109d.
Agora, 454a.
Agosto, Uruguay, 6007a.
Agouara, 4908a.
Agouti, 91c.
Agra, India, 91d.
Agraphia, 291b.
Agrarian Laws, 92a.
Agreement in number, 4310c.
Agreement of subject and verb, 6057b.
*Agricola*, 5676c.
Agricola, Gnaeus Julius, 92c.
Agricultural botany, 862d.
Agricultural chemistry, 96a, 1298b.
Agricultural colleges, Canadian, 102d.
Agricultural Department building, 6195d.
Agricultural education, 96a, 100a.
Agricultural experiment stations, 104a.
Agricultural high school, 103a.
Agricultural machinery, 94d.
Agricultural wealth in the United States, 5956d.
Agriculture, 92a.
Agriculture, Department of, Canadian, 106d.
Agriculture, Department of, United States, 105b.
Agriculture for schools, Courses in, 107a.
Agriculture in Canada, 1104a.
Agrigentum, Sicily, 115b.
Agrimony, 115b.
Agrippina, 115c.
Agua, Mount, 2632c.
Aguas Calientes, Mexico, 115d.
Ague, 115d.
Aguinaldo, Emilio, 116a, 4634b.
Agulhas, Cape, 116b.
Ahab, 116b.
Ahaggar Range, 5142c.
Ahasuerus, 116c, 2081a.
Ahaz, 116c.
Ahenobarbus, Cnaeus Domitius, 4118b.
Aherne, James, 2783a.
Ahmed Mirza, 4596a.
Ahriman, 6419a.
Ahura Mazda, 6419a.
*Aida*, 116c, 6059b.
Aid-de-camp, 116d.
Aigrette, 1964c, 2144d.
Aikins, James Cox, 117a.
Ailanthus, 117b.
Ailerons, 2239a.
Aino, 117c.
Air, 117c, 1886d.
Air brake, 118d.
Air cells, 119d.
Air compressor, 120a.
Air drafts, 3411b.
Airedale terrier, 5763d.
Air engine, 120c.
Air gun, 121a.
Air plants, 121b.
Air pump, 121b.
Air range, 5142c.
Air roots, 5078c.
Air sacs, 3537a.
Airship, 2236a.
Aisne, Battle of the, 122b.
Aisne River, 122b.
Aitken, John, 1887b.
Aix, France, 122c.
Aix-la-Chapelle, Congress of, 123a.
Aix-la-Chapelle, Prussia, 122d.
Aix-la-Chapelle, Treaties of, 123b.
Ajaccio, Corsica, 123b.
Ajax, 123c.
A Kempis, Thomas, 5794c.
Akkad, 532c.
Akmolinsk, Siberia, 4376a.
Akri, Greece, 26d.
Akron, Ohio, 123d.
Alabama, 124a.
*Alabama* (warship), 131c.
Alabama, University of, 133a.
Alabama claims, 131d.
Alabama River, 131b.
Alabaster, 133c.
Aladdin, 133d.
Alameda, Cal., 134a.
Alamo, The, 134b.
Alaric I, 134d.
Alaric II, 1542d.
Alaska, 135a, 4964d.
Alaska boundary dispute, 143b.
Alaska Peninsula, 135c.
Alaska railroad, 140a.
Alaska-Yukon-Pacific Exposition, 146c.
Al-ay-ed-sa, 135b.
Alba Longa, 5057b.
Albania, 146c.
Alban Mountains, 149b.
Albany, Ga., 149c.
Albany, N. Y., 150a.
Albany Convention, 149b, 5978c.
Albany Regency, 6026b.
Albany River, 151c.
Albatross, 151c, 247b.
Albedo, 4117d, 6054a.
Albemarle and Chesapeake Canal, 1147a.
Albemarle Sound, 152a.
Alberni, Vancouver I, 6033c.
Alberoni, 4630c.
Albert, Francis Charles, 152a.
Albert I, 152b, 6155d.
Albert III, 2687b.
Alberta, Canada, 153a.
Alberta, Mount, 154a.
Alberta, University of, 163c.
Albert Edward, Prince of Wales, 6079c.
Albert Edward Nyanza, 163d.
Albert Nyanza, 164a.
Albert of Saxe-Coburg-Gotha, 6079b.
Albigenses, 164a.
Albino, 164b.
Albion, 1260b, 2035b.
Albion press, 4825c.
Albite, 2150b.
Albright, Jacob, 2102c.
Albufera Lagoon, 5473c.
Albumen, 164c, 1960d.
Albuquerque, N. M., 164d.
Alburnum, 165b.
Alcestis, 165c.
Alchemy, 165c, 1293c, 2523a, 4331b.
Alcibiades, 166d.
Alcmene, 2779d.
Alcohol, 167b, 281c, 1587d, 2741c.
Alcoholic drinks, 168a.
Alcoholometers, 2889c.
Alcorta, Dr. José Figueroa, 342a.
Alcott, Amos Bronson, 171c.
Alcott, Louisa May, 171a.
Alcuin, 1274b.
Alcyone, 4707a.
Aldebaran, 446b.
Alden, Isabella McDonald, 171c.
Alden, John, 171d, 1616a, 3705d.
Alder, 172b.
Alderman, 172c, 1515b.
Alderman, Edwin Anderson, 172d.
Alderney Islands, 172d.
Aldershot, England, 173a.
Aldrich, Nelson Wilmarth, 173a.
Aldrich, Thomas Bailey, 173b.
Aldrich-Vreeland Bill, 580c.
Ale, 173c, 3415b.
Alecto, 2353a.
Alencon, France, 173d.
Aleppo, Turkey, 173d.
Aletsch glacier, 213b.
Aleutian Islands, 174a.
Aleutian Range, 136d.
Aleuts, 174b.
Alewife, 174c.
Alexander (Greece), 6053d.
Alexander (Popes), 174c.
Alexander I (Russia), 174d.
Alexander II (Russia), 175a, 5119d.
Alexander III (Russia), 175a.
Alexander, Cecil Frances, 4100c.
Alexander, John White, 175b.
Alexander, William, 4300d.
Alexander Archipelago, 136b.
Alexander of Serbia, 4607d.

Alexander Severus, 175c.
*Alexander's Feast*, 1868a.
Alexander the Great, 175c, 4677a, 5783b.
Alexandra (queen), 177d, 1957d.
Alexandra of Hesse, 4230c.
Alexandria, Battle of, 11a.
Alexandria, Egypt, 178a.
Alexandria, La., 178d.
Alexandria, Va., 179b.
Alexandria Bay, 5157a.
Alexandrian Age, 179d.
Alexandrian Library, 178d.
Alexius Comnenus, 1032a, 4753a.
Alfalfa, 179d.
Alfalfa weevil, 6240a.
Alfieri, Vittori, Count, 182c.
Alfilaria, 2462c.
Alfonso XIII, 182d, 5479a.
Alfred the Great, 183a, 2043b.
Algae, 183d.
Algardi, Alessandro, 184c.
Algebra, 184b.
Algebraic equations, 192c.
Alger, Horatio, 195c.
Algeria, 195c.
Algiers, Algeria, 198a.
Algoa Bay, 4767c.
Algol, 198b, 5528c.
Algonkian System, 198d.
Algonquian Indians, 199a.
Algonquin Park, 199c.
Alhambra, 199d, 308d.
Alias, 200a.
Aliat, 174b.
Ali Babi, 200a.
Alibi, 200b.
*Alice*, 4450.
*Alice's Adventures in Wonderland*, 200b.
Alien, 200c.
Alien and sedition laws, 200d.
Alimentary canal, 201a.
Ali Mirza, 4595d.
Ali Pasha of Tepelen, 148b.
Aliphatic hydrocarbons, 2888a.
Alizarin, 201c.
Alkali, 201d.
Alkali flats, 4134a, 4172c.
Alkali soils, 202b.
Alkaloids, 202c.
Allah, 202d.
Allahabad, India, 203a.
Allah Akbar, 203a.
Allan, Sir Hugh Montagu, 203b, 1126c.
Alleghany Mountains, 203c.
Allegheny, Pa., 4687b.
Allegheny River, 203c, 4566a.
Allegory, 203d.
Allegretto, 4026a.
Allegri, Antonio, 1596b.
Allegro, 4026a.
Allen, Charles Grant Blairfindie, 204a.
Allen, Ethan, 204a.
Allen, Grant, 1143a.
Allen, James Lane, 204c, 1182d.
Allen, William, 2730b.
Allentown, Pa., 204d.
All-fools' day, 205b.
All Hallow summer, 2971a.
Alliance, Ohio, 205b.
Alligator, 205c, 1641d.
Alligator mound, 3976a.
Alligator pear, 206a.
Alligator snapping turtle, 5920c.
Alligator terrapin, 5762d.
Alligator wrench, 6362b.
Allison, Charles F., 3979b.
Allison, William Boyd, 206c.
Alliteration, 206d.
Allopathy, 207a, 2820c.
Allotropy, 207a.
Alloy, 207b.
Alloys of silver, 5385d.
Alloys of steel, 5542c.
All-Russian Zemstvos Union, 5122b.
All-Saints' day, 207c.
All-Souls' day, 207d.
Allspice, 207d.
All Spirits' day, 2671a.
Allston, Wash., 208a.
All-the-year-round schools, 5244b.
Allumette Lake, 4556a.
Alluvium, 208a.
*Almagest*, 4862d.
Almagro, Diego de, 4692d, 5451d.
Alma mater, 208b.
Almanac, 208b.
*Almanach de Gotha*, 208d.
Almandine, 209b.
Almandite, 209b.
Alma-Tadema, Lawrence, 209c, 2821d.
Almeria, Spain (city), 209c.
Almeria (province), 2557d.
Almohades, 3954a.
Almond, 209d.
Almonte, Ont., 210a.
Almoravides, 3954a.
Aloe, 210b.
Alpaca, 210d, 3471a, 3871c.
Alpena, Mich., 211a.
Alpha, 4683d.
Alpha and Omega, 211c.
Alphabet, 211c.
Alphabet, Deaf and Dumb, 1718d.
Alpheus River, 333a, 471d, 2604c.
Alpine larch, 3333d.
Alps, 212b.
Alsace-Lorraine, 213d, 2311d.
Alsike, 1440a.
Altai Mountains, 214d.
Altair, 446a.
Altar, 215a.
Altdorf, Switzerland, 215c.
Alternate arrangement of leaves, 3361d.
Alternating current, 1675a, 1894b.
Alternation of generations, 967d, 2154d.
Altgeld, John Peter, 215d, 1422d.
Alto, 5390d.
Alton, Ill., 215d.
Altona, Prussia, 216b.
Altoona, Pa., 216c.
Altorf, Switzerland, 215c.
Alto-rilievo, 217a.
Altruism, 217a.
Alum, 217b.
Alumina, 217c.
Alum in bread, Test for, 910c.
Aluminum, 217d.
Aluminum bronze, 950b.
Alva, Ferdinand Alvarez de Toledo, 218d.
Alvarado, Pedro de, 219a, 1253d, 5179a.
Alveoli, 5728d.
Alverstone, Lord, 219b.
Alves, Rodrigues, 907a.
Alyssum, Sweet, 5652c.
Amadeus I, Victor, 5208a.
Amalekites, 219b.
Amalgam, 219c, 2524d.
Amalgamation, 3751b.
Amalie of Oldenburg, 4430d.
Amana Society, 219c, 1516d.
Amanita mushroom, 4014c.
Amanitopsis mushroom, 4014c.
Amapala, Island of, 2825d.
Amaranth, 219d.
Amargosa Mountains, 1722a.
Amarillo, Tex., 220a.
Amarna Letters, 3387a.
Amaryllis family, 220b.
Amasis, 4745a.
Amateur athletics, 457b.
Amateur photography, 4650c.
Amati, Nicola, 5582d.
Amazon River, 220c, 841b.
Amazon River basin, 900a.
Amazons, 221c.
Ambassador, 222a.
Amber, 222b, 1984a.
Ambergris, 222d.
Ambert (Palatinate), 4457c.
Ambition, 222d.
Amblyopia, 769d.
Ambrose, Saint, 224c.
Ambrosia, 224c.
Ambrosian Library, 3795c.
Ambulance, 224d.
Ameer, 75a.
Amen, 225a.
Amendment, 225b.
Amendments to the Constitution, 1560d.
America, 225c.
*America* (hymn), 225d.
America, Father of, 2141d.
American Academy of Arts and Letters, 18c, 226b.
American Academy of Arts and Sciences, 18c.
American Academy of Design, 4455c.
American aloe, 3769b.
American Association for Study and Prevention of Infant Mortality, 526b.
American baseball leagues, 605b.
American Beauty rose, 226d.
American buffalo, 981d.
American coins, Rare, 4311d.
American cress, 1632c.
American crocodile, 1641b.
American drama, 1852a.
American eagle, 1897c.
American elk, 2013d.
American Fabius, 2122a.
American Federation of Labor, 227c, 3282b.
American Geographic Society, 2421d.
American goldfinch, 227c.
American Highway Association, 5032d.
American ivy, 6100c.
American libraries, 3402d.
American lion, 4478d.
American literature, 227b.
American merganser, 3745d.
American national hymn, 2894c.
American ortolan, 4417a.
American otter, 4430a.
American Pacific Exposition, 3395c.
American plane tree, 5667a.
"American plan" hotel, 2848a.
American race, 4909c.
American Red Cross Society, 4952a.
American sable, 3666c.
American sparrow hawk, 2723b.
American spikenard, 5499a.
American Titian, 208a.
American University, 234b.
American widgeon, 6281b.
American woodcock, 6351a.
Americas, Flags of the two (color plate), facing 2196.
America's Cup, 931b.
Americus, Ga., 234c.
Americus Vespucius, 225d, 1503b, 6072d.
Amerind, 3976d.
Ames, Oakes, 1629d.
Amesbury, Mass., 234d.
Amethyst, 235a, 4886d.
Amfortas, 4515c.
Amherst, Jeffrey, Baron, 235b.
Amherst, N. S., 235b.
Amherstburg, Ont., 235d.
Amherst College, 235c.
Amia, 1830c.
Amiens, France, 236a.
Amiens, Treaty of, 4064d, 4686c.
Ammeter, 239a.
Ammon, 236b.
Ammonia, 236c, 281d.
Ammonia water, 202a.
Ammonium alum, 217c.
Ammonium carbonate, 5411a.
Ammonium chloride, 5170a.
Ammunition, 237a, 4242a.
Amnesty, 238a.
Amnesty Act, 2569c.
Amoeba, 238a, 4847d.
Amontillado, 5351b.
Amoor River, 241b.
Amorites, 1091a.
Amorphous silica, 5381a.

Amoy, China, 238c.
Ampere, 238d.
Amphibians, 239b.
Amphibole, 2837b.
Amphibrachic meter, 3755d.
Amphictyonic Council, 4628a.
Amphion, 4240a.
Amphitrite, 4117c.
Amplitude of oscillation, 4559a.
Amputation, 239c.
Amritsar, India, 4872c.
Amsterdam, Holland, 239d.
Amsterdam, N. Y., 240b.
Amter, 1759d.
Amulet, 240c.
Amulius, 5066b.
Amundsen, Roald, 240d, 4280b, 4727d.
Amur River, 241b.
Amusements, 241c.
Amylopsin, 4477a.
Amyntas II, 4627c.
Amytis, 2683d.
*An*, When to use, 399b.
Anabaptists, 242b.
*Anabasis*, 242b, 6376b.
Anaconda, 242c.
Anaconda, Mont., 243a.
Anacostia River, 6194a.
Anaemia, 243b.
Anaesthetic, 253a.
Anagram, 243c.
Analysis, 243d.
Analysis (psychology), 5799b.
Analysis of sentence, 5304b.
Analytical geometry, 2444c.
Anam, Indo-China, 262d.
Ananias, 244d.
Anapestic meter, 3755d.
Anarchical revolution, 4983c.
Anarchism, 244d.
Anastasia Island, 5144d.
Anatolia, 424b, 5908b.
Anatomy, 245b.
Anatomy of the ear, 1898c.
Anatomy of the eye, 2118a.
Anatomy of the head, 2738d.
Anatomy of the heart, 2746a.
Ancestor worship, 246b, 1347b.
Anchor, 246d.
Anchor bend knot, 3270d.
Anchor-ice, 331d.
Ancient history, 2801d.
Ancient lamps, 3304c.
*Ancient Mariner, The*, 247a.
Ancient Order of Foresters, 2263c.
Ancient Order of Hibernians, 2319a.
Ancient Order of United Workmen, 247b.
Ancient Roman year, 6385c.
Ancient theaters, 5781d.
Ancon, Peru, 4109b.
Ancona, Italy, 247c.
Andalusia, Spain, 5473d.
Andalusians, 3943a.
Andante, 4026a.
Andantino, 4026a.
Andean Cordillera, 5449b.
Andersen, Hans Christian, 247c.
Anderson, Ind., 248b.
Anderson, Marie Antoinette, 248a.
Anderson, S. C., 248d.
Andersonville, Ga., 249a.
Andes Mountains, 249b, 1331d, 5449b.
Andorra, 250d.
Andrade, Ignacio, 6050d.
Andre, John, 251b, 4989a.
Andrée, Salomon August, 251d, 560c.
Andrews, Elisha Benjamin, 252a.
*Androcles and the Lion*, 3454d, 5575c.
Andromache, 252b, 2757d.
Andromeda, 252b.
Andromeda, Nebula of, 4108a.
Andros, Edmund, 252c, 1282c.
Androscoggin River, 3396a.
Anemia, 243b.
Anemometer, 6310d.
Anemone, 252d.
Aneroid barometer, 598b.
Anesthesia, 253a.
Anesthetic, 253a.
Anesthetic leprosy, 3384c.
Angel, 254a.
Angelico, Fra, 254b.
Angell, James Burrill, 254c.
*Angelus, The*, 255a, 4450.
Angermann River, 5646c.
Angina pectoris, 255b.
Angiosperms, 255c, 862b, 1611b.
Angle, 255d.
Angle of dip, 5588c.
Angle of incidence, 3424b, 4957a.
Angle of polarization, 4731c.
Angle of reflection, 3424b, 4957b.
Angler, 256a, 1780c.
Angles (tribe), 256b.
Angleworm, 1906c, 5431b.
Anglican Church, 256b, 4960c.
Anglin, Francis Alexander, 256d.
Anglin, Margaret, 256c.
Angling, 257a.
Angling, Father of, 2141d.
Anglo-Norman literature, 2053c.
Anglo-Saxon literature, 2053b.
Anglo-Saxons, 258b, 2051c.
Angola, Africa, 258c.
Angora, Turkey, 258d.
Angora cat, 1221b.
Angora goat, 2518a.
Angora rabbit, 4907a.
Angra, Azores, 522d.
Angra Mainyu, 6419a.
Anguilla Island, 5147d.
Angular measurement, 1766a.
Anhydrous ammonia, 1470a, 2903c.
Aniline, 259b.
Animal, 259c.
Animal anatomy, 245b.
Animal charcoal, 810a, 1270a.
Animal dispersal of seed, 5294a.
Animal fibers, 2160d.
Animal foods, 6042c.
Animal geography, 2427c.
Animal Industry, Bureau of, 106b.
Animal intelligence, 260a.
Animal life in Canada, 1100b.
Animal life of the ocean, 4333a.
Animal magnetism, 2896d, 3749b.
Animal migration, 261d.
Animal perfumes, 4584c.
Animals, Ages of, 3419b.
Animals, Diseases of, 1805b.
Animal world, Divisions of the, 6417c.
Animal worship, 262b.
Animal zones, 6416a.
Animikean System, 4846c.
Animists, 2945c.
Anion, 2000b, 3032a.
Anise, 262c.
Anjou pear, 4542c.
Ann, Cape, 262d.
*Annals of Congress*, 1536d.
Annam, 262d, 2972d.
Annapolis, Md., 263c.
Annapolis Convention, 263b, 1559d.
Annapolis River, 4297a.
Annapolis Royal, N. S., 264a.
Ann Arbor, Mich., 264b.
Anne, Queen, 264d.
Annealing, 265a.
Anne de Montmorency, 3932a.
Anne Hathaway cottage, 5334d.
Anne of Cleves, 2771c.
Annexation, 265b.
Annexation map, United States, 265c.
*Annie Laurie*, 266b.
Anniston, Ala., 266b.
Anniversaries for celebration, 267a.
Annobon Island, 5476b.
Anno domini, 1371d.
Annuals, 267b.
Annual stems, 5546a.
Annual weeds, 6238d.
Annuity, 267b.
*Annunciation, The*, 267c.
Annunzio, Gabrielle D', 267d.
Anodyne, 4069a.
Anomalistic month, 3931b.
Anopheles mosquito, 3611a, 3967a.
Anorthite, 2150b.
Anquetil-Duperron, 6410c.
Ansgar, 3843c.
Ansonia, Conn., 268a.
Ant, 268b.
Antakiyeh, 284d.
Antananarivo, Madagascar, 5696c.
*Ant and the Grasshopper, The*, 5576c.
*Ant and the Sluggard, The*, 4849a.
Antarctic Circle, 276a.
Antarctic lands and seas, 276b.
Antares, 446a, 5255c.
Ant-eater, 277c.
Antecedent of pronoun, 4837b.
Antecedent of ratio, 4843a.
Antelope, 277d.
Antelope Island, 2598d.
Antennae, 278d, 1653c.
Antennarius, 2185a.
Antenor, 4444a.
Anterior poliomyelitis, 2988a.
Anterior superficial vein, facing 1388.
Anther, 2223d.
Anthology, 279b.
Anthony, Saint, 279c.
Anthony, Susan Brownell, 279c.
Anthony Hope, 2725b.
Anthracite coal, 1443a.
Anthracnose, 634c.
Anthrax, 279d.
Anthropogeography, 2428b.
Anthropology, 280a.
Anthropomorphism, 4041d.
Anti-aircraft guns, 404a.
Anti-Cigarette League of America, 280c, 1378d.
Anti-climax, 1432c.
Anticosti, 281a.
Anticyclones, 1680b, 5563a.
Antidote, 281c.
Antietam, Battle of, 282d.
Anti-Federalists, 283b, 4734d.
Antigone, 283c, 4344b.
Antigonish, N. S., 283c.
Antigonus of Macedon, 4880b.
Antigua, Leeward Is., 3370b.
Anti-Lebanon Mountains, 3364a.
Antilles, Pearl of the, 1655a.
Antilles, The, 283d, 946c.
Anti-Masons, 284a.
Antimony, 284b.
Antioch, Syria, 284c.
Antioch College, 3634d.
Antipater, 1755b.
Antipodes, 284d.
Antipodes Island, 285a.
Anti-polygamy law, 1420c.
Antipope, 285a.
Antipyrene, 285b.
Anti-Saloon League, 285c, 4833d.
Antisana, Mount, 5449d.
Antiseptics, 285c, 3457b.
Antisthenes, 1681d.
Antitoxin, 286c.
Anti-trust legislation, 286d, 5684b, 5894a.
Anti-trust movement, 3573a.
Antivari, Montenegro, 3913b.
Ant-lion, 286d.
Antoninus, Wall of, 5056d.
Antony, Mark, 287a, 1377c, 1417b.
Antwerp, Belgium, 287d.
Anubis, 289a.
Anvers, Belgium, 287d.
Anvil, 289a.
Anzac, 6115b.
Aornis, 519b.
Aorta, 7c, 289c, facing 1388.
Apache Indians, 289c.
Apalachicola River, 290b.
Apatite, 2688b.

Ape, 290b, 3891a.
Apelles, 290d.
Apennine Mountains, 291a.
Aphasia, 291a.
Aphelion, 304c.
Aphemia, 291b.
Aphides, 271d, 291b.
Aphrodite, 291b, 6054c.
Apia, Samoa, 291c, 5182a.
Apis, 291c.
Apo, Mount, 4632a.
Apocalypse, 291d, 4980d.
Apocrypha, 291d.
Apogee, 304b, 4586c.
Apollinaris water, 3818d.
Apollo, 292a.
Apollonius of Perga, 179d.
Apoon Pass, 6404d.
Apoplexy, 292c.
Apostate, The, 3181d.
Apostle of free trade, 1451d.
Apostle of Germany, 811a.
Apostle of the English, 476b.
Apostle of the Indies, 6375b.
Apostles, The, 292d.
Apostles' Creed, 293a.
Apostle to the Indians, 2011d.
Apothecaries' pound, 4802c, 5889c.
Apothecaries' weight, 293b, 1765c.
Apothecary, 1865b.
*Apotheosis of Washington,* 6195b.
Appalachian Highland, 5946c.
Appalachian Mountains, 293b.
Appeal, 293d.
Appel, 2151c.
Appellate court, 1614b.
Appendicitis, 293d.
Appendicular skeleton, 5398d.
Appendix, 7d, 294a.
Apperception, 294c.
Appert process of glass making, 6319d.
Appetite, 295a.
Appian Way, 295c.
Appius Claudius, 295c.
Apple, 295b.
Apple, The Golden, 5887b.
Apple butter, 1378b.
Applejack, 1378b.
Apple of Discord, 300a.
Apple scab, 298d.
Appleton, Wis., 300a.
Apple-tree borer, 298d.
Apple-tree tent caterpillar, 5759b.
Applied chemistry, 1298b.
Applied mathematics, 3696c.
Apportionment of representatives, 4973b.
Apprentice, 300c.
Apprentices (guilds), 2636b.
*Apprenticeship of Wilhelm Meister,* 2522a.
Appuleius, 4302b.
Apricot, 300d.
April, 301b.
Apse, 325d, 4093d.
Apsides, 304b.
Aptera, 3000c.
Apteryx, 304c.
Apure River, 4413c.
Aquatic plants, 6218a.
Aquae Sextiae, 122d, 1379b.
Aquae Solis, 621d.
Aqua fortis, 4241a.
Aquamarine, 304d.
Aquaplaning, 304d.
Aqua regia, 305b, 2524a.
Aquarium, 305b, 4084b.
Aquarius, 306b.
Aquatic plants, 6218a.
Aquatown, Kamerun, 3201a.
Aqueduct, 306c.
Aqueduct of Hadrian, 454a.
Aqueduct of Nero, 307a.
Aqueous ammonia, 236c.
Aqueous humor, 2118b.
Aquila, 2194b.
Aquila (constellation), 3805c.
Aquinas, Saint Thomas, 308b.
Arabat, 522d.
Arab boys at school, 417a.
Arabesque, 308b.
Arabet-el-Madfun, Egypt, 13d.
Arab horse, 2841b.
Arabia, 308d.
Arabia Felix, 311a.
Arabian camel, 1078d.
*Arabian Nights Entertainment,* 311c, 5908d.
Arabian Sea, 311d.
Arabic notation, 4291a.
Arabic numerals, 312a.
Arabi Pasha, 6345b.
Arabs, 312b.
Arachne, 313c.
*Arachne, Story of,* 4049b.
Arachnida, 313d.
Arachnoid membrane, 891c.
Arago, Dominique Francois, 314a.
Aragon, Spain, 1218a.
Aragon and Castile, 5477b.
Araguaya River, 5827a.
Aral Sea, 314b.
Aramaic, 314b, 2755a.
Arango, Doroteo, 6084d.
Arapaho Indians, 314c.
Ararat, Mount, 314c.
Arar River, 5203b.
Araucanian family, 1331c, 1334d.
Aravalli Hills, India, 4925d.
Arawak Indians, 3106d.
Arbela, Assyria, 314d.
Arbela, Battle of, 2167b.
Arbil, Turkey, 314d.
Arbitration, 314d.
Arbitration, Permanent Court of, 4536a.
Arbor day, 315d.
Arbor day program, 316a.
Arbor vitae, 317a, 1527d.
Arbuckle Mountains, 4359d.
Arbutus, 317b.
Arc, 1386a.
Arcade, 317c.
Arcadia, 318a.
Arcadius, 1031c.
Arcature, 317d.
Arc de Triomphe de L'Etoile, 329b.
Arch, 318b, 324d.
Arch, Stones of, 318c.
Archaeological Age, 90c.
Archaeology, 319a.
Archangel, Russia, 319c.
Archbald, Robert W., 2936a.
Archbishop, 319d.
Archbishop of Canterbury, 1162a.
Arch bridges, 921a.
Archduke, 1876c.
Archean System, 320a, 2438d.
Archelaus, 2783d.
Archeozoic Era, 2438b.
Archer, The, 5141b.
Archer-fish, 320b.
Archery, 320c.
Archibald, Sir Adams George, 321a.
Archimedean screw, 321b.
Archimedes, 321c, 2579d, 2580a, 2890b.
Archipelago, 321d.
Architecture, 322a.
Architrave, 1507d.
Arch of aorta, facing 1388.
Arch of Constantine, 1554d.
Arch of Hadrian, 454a.
Arch of Titus, 5822a.
Arch of Trajan, 5858b.
Arch of Triumph, 329b.
Archon, 329c.
Arch Rock, Mackinac, 3569a.
Arc light, 1991d, 1992b.
Arcola, Sask., 329d.
Arctic charr, 5886b.
Arctic Circle, 330b.
Arctic fox, 2280b.
Arctic lands and seas, 330d.
Arctic least weasel, 6229c.
Arcturus, 5528c.
Arden, Mary, 5332a, 5586a.
Ardmore, Okla., 332a.
Are (measure), 3759a.
Area, 332c.
Area of circle, 1386d.
Area of parallelogram, 3735b.
Area of polygon, 4746a.
Area of pyramid, 4877a.
Area of rectangle, 3734d.
Area of rhombus, 5003c.
Area of trapezoid, 3736a.
Area of triangle, 3735c, 5877c.
Areolar subcutaneous tissue, 5400d.
Areopagus, 332c, 454a, 4586a.
Arequipa, Peru, 332d.
Ares, 3661d.
Ares, Hill of, 332d.
Arethusa, 333a, 2788a, 4046a.
Arethusa, Fountain of, 5670d.
Arezzo, Italy, 333b.
Argand, Aimé, 333b.
Argand lamp, 333b.
Argenta, Ark., 333d.
Argentina, 334a.
Argentina (coin), 1468a.
Argentite, 5386b.
Argentoratum, 5584d.
Arginusae, Battle of, 5428c.
Argo, Ill., 5530d.
Argol, 1628a, 5707a.
Argolis, 318b.
Argon, 343b.
Argonaut (fish), 343b.
Argonauts, 343c, 3715c.
Argus, 343d.
Argyll, John Douglas Sutherland Campbell, 344a.
Ariadne, 344c, 5788d.
Arid region, 345a.
Ariel, 2410b.
Aries, 345b.
Arista, Mariano, 345b.
Aristides, 345c.
Aristocracy, 345d.
Ariston, 4702c.
Aristophanes, 346a.
Aristotle, 346a, 4641d.
Arita, Japan, 346d.
Arithmetic, 347a, 5803a.
Arithmetic, Graded course in, 350a.
Arizona, 354a.
*Arizona,* The, facing 4096, 6180b.
Arizona, University of, 363a.
Arizona rubies, 2394d, 5101a.
Ark, 363c.
Arkansas, 363b.
Arkansas, University of, 371b.
Arkansas Indians, 371b.
Arkansas River, 371a.
*Arkansas Traveler,* 369d.
Ark of the Covenant, 5673d.
Arkwright, Sir Richard, 371c, 4293c.
Arlington, Mass., 371c.
Arlington National Cemetery, 372a, 1810d.
Arlington radio station, 6325b.
Arm, 372c.
Armada, The Invincible, 373a, 2167c.
Armadillo, 373d.
Armageddon, 374a.
Armature, 374a, 3595d.
Armenia, 374b, 5909d.
Armies of the world, 381b.
Arminius, 477c.
Armor, 375c.
Armored automobiles, 518b.
Armored cruiser, 4096c.
Armor plate, 6182d.
Armory, 376d.
Armour, Jonathan Ogden, 377a.
Armour, Philip Danforth, 376d.
Armour Institute of Technology, 377a, 2642d.
Arms, 377b.
Armstrong, Charles, 3725a.
Armstrong, George B., 4791d.
Armstrong, Samuel Chapman, 378a, 2678d.
Armstrong, William George, Lord, 378c.
Army, 378b.
Army rank, 4928d.

Army worm, 385d.
Arnhem, Holland, 386b.
Arnica, 386c.
Arnicin, 386c.
Arno River, 386c.
Arnold, Benedict, 386d, 4989a.
Arnold, Sir Edwin, 387c.
Arnold, Matthew, 387d.
Arnold, Thomas, 388a, 5101d.
Arnprior, Ont., 388b.
Aromatic hydrocarbons, 2888a.
Aromatic plants, 388c.
Arrack, 1457d, 4462d, 5007d.
Arrest, 388c.
Arretium, 333b.
Arrondissement, 1162c, 1771c.
Arrow, 868d.
Arrowheads, 869b.
Arrowrock Dam, 793d, 2912a.
Arrowroot, 389a.
Arsaces, 4517c.
Arsenal, 389b.
Arsenal of Venice, 6052c.
Arsenic, 281d, 389c, 3002b.
Arsenious acid, 389c.
Arson, 389d.
Artabanus, 6376d.
Art and the arts, 390a.
Artaxerxes, 1683c.
Artemis, 390d, 1787a.
Arterial bleeding, 767a.
Arteries, 391a, 1388a.
"Artesian City," 149c.
Artesian well, 391c.
Arthropoda, 392b.
Arthur, Chester Alan, 392b.
Arthur, Sir George, 398a.
Arthur, Julia, 398b.
Arthur, King, 398c.
Artichoke, 398d.
Article (grammar), 399a.
Articles, The Thirty-nine, 401a.
Articles of Confederation, 401a, 5979c.
Articular rheumatism, 4993a.
Articulation, 401d.
Artificial feeding of infants, 528d.
Artificial flowers, 2226b.
Artificial gems, 2413d.
Artificial ice, 2903a.
Artificial leather, 3359d.
Artificial limbs, 401d.
Artificial perfumes, 4585a.
Artificial pruning, 4852d.
Artificial respiration, 4868a.
Artificial silk, 1248a, 5383b.
Artificial somnambulism, 2897c.
Artillery, 402d, 5677c.
Art museums, 1952c.
Art of Japan, 3118a.
*Art of Poetry*, 1794b.
Arts and crafts, 406b.
Arts and crafts, Indian, 2964a.
Arum, 407a.
Arveyron River, 3744d.
Arwad, Asia Minor, 4645a.
Aryan, 407b.
Asafetida, 407b.
Asbestos, 407c, 2183c.
Asbjornsen, Peter Christen, 408b.
Asbury, Francis, 408b.
Asbury Park, N. J., 408c.
Ascending colon, 7d, 3024b.
Ascending node, 4244b.
Ascending vena cava, 6045c.
Ascension and declination of stars, 408d.
Ascension day, 409a.
Asceticism, 409a.
Ascidians, 5285a.
Asculum, Battle of, 4880b.
Ascutney, Mount, 6063b.
Aseptic method of surgery, 286c.
Asgard, 409b, 4046c, 4248c.
Ash, 409d.
Ashanti, 84b, 410a.
Ashburton, Alexander Baring, 410b.
Ashdod, 4638d.
Ashes, 409d.
Asheville, N. C., 410b.
Ashkelon, Canaan, 4638d.
Ashland, home of Henry Clay, 3227c.
Ashland, Ky., 411a.
Ashland, Wis., 411b.
Ashlar, 988b.
Ash-leaved maple, 1976c.
Ashokan reservoir, 307d.
Ashtabula, O., 411c.
Ashton, William T., 4371a.
Ashuanipi, Lake, 2676b.
Ashurbanipal, 432b.
Ash Wednesday, 412a.
Asia, 412a.
Asia Minor, 424a.
Asiatic cholera, 1361c.
Asp, 424c.
Asparagus, 424c.
Aspasia, 425a.
Aspen, 425b, 4759c.
Aspen-leaved birch, 728d.
Asphalt, 425c.
Asphalt pavement, 5029c.
Asphodel, 426b.
Asphyxiation, 281d, 426c.
Aspinwall, Panama, 4470c.
Aspinwall, William H., 1481a.
Aspirate, 2651a.
Aspirin, 5175a.
Asquith, Herbert Henry, 426c.
Ass, 427b.
Assam, India, 427c, 4921d.
Assassination, 427d.
Assault and battery, 428a.
Assaying, 428b.
Assay office, 428d.
Asseheholar, 4418d.
Assembly, 428d, 4974b.
Asses' bridge, 2446c.
Assessor, 428d.
Assignment, 429a.
Assimilation, 429a.
Assiniboia, Sask., 429c.
Assiniboine, Mount, Canada, 430a, 1095c.
Assiniboine River, 430a.
Assiniboin Indians, 429d.
Assistance, Writ of, 6364c.
Assiut, Upper Egypt, 5396b.
Assizes of Jerusalem, 2520a.
Associated Press, 430b.
Association, Laws of, 430c.
Association football, 2260a.
Associations, Labor, 3285d.
Assu, 2093a.
Assuan, 431a.
Assumption, Feast of the, 431c.
*Assumption of the Virgin*, 4450.
Assur, 432d.
Assurbanipal, 431d.
Assurnazirpal, 433d.
Assyria, 432b.
Astarte, 434c, 4644d.
Aster, 434d.
Asteroids, 435b, 4696b.
Asthma, 435c.
Astigmatism, 436a, 5488a.
Astor family, 436c.
Astoria, Ore., 437c.
Astraea, 6101d.
Astragalus, 2253a.
Astrakhan (fur), 438a.
Astrakhan, Russia, 438b.
Astringent, 438b.
Astrology, 438b, 5633a.
Astronomical telescope, 5743b.
Astronomy, 439b, 4695a, 5528a.
Astyages, 1683b.
Asuncion, Paraguay, 449b.
Asylum, 450a.
Asyut, Upper Egypt, 5396b.
Atahualpa, 450b, 4693a.
Ataijros, Mount, 5000d.
Atalanta, 450c.
*Atalanta, The Story of*, 4052c.
Atavism, 450c.
Atchafalaya River, 450c.
Atchison, David Rice, 451a.
Atchison, Kan., 450d.
Atchison, Topeka & Santa Fe Railroad, 4921a.
A tempo, 4026a.
"A" tent, 5758c.
Athabaska (former province), 451a.
Athabaska, Mount, 451d.
Athabaska Lake, 451b.
Athabaska Landing, 451d.
Athabaska River, 451a.
Athapascan Indians, 451d.
Atheism, 452a.
Athelstan, 452c.
Athena, 452d.
Athenaeum, 452c.
Athene, 3819a.
Athens, Ga., 456a.
Athens, Greece, 452b, 2601a, 2606a.
Athens, O., 456c.
"Athens of America," 456c.
"Athens of Iowa," 3042d.
Atherton, Gertrude, 456c.
Athletics, 457a, 3417b.
Athor, 459c.
Athos, Mount, 459c.
Atikonak, Lake, 2676b.
Atlanta, Ga., 460a.
Atlantes, 1211d.
Atlantic cable, 1037c.
Atlantic City, N. J., 461a.
Atlantic coastal plain, 1449c.
"Atlantic Gateway," 2668d.
Atlantic Ocean, 461c.
Atlantic provinces, 4296a.
Atlantic time, 5524b.
Atlantis, 463b.
Atlas, 463b, 2780c.
Atlas Mountains, 463c.
Atmosphere, 117c, 1902c, 2074a, 2433b.
Atmosphere of the moon, 3939d.
Atmospheric dust, 1887a.
Atmospheric pressure, 793a.
Atoll, 463d, 1577a.
Atom, 464a, 1296b.
Atomic theory, 464d.
Atomic weights, 465a, 1294c.
Atonement, 465b.
Atossa, 6376c.
Atreus, 4555c.
Atrium, 465d.
Atrophy, 466a, 1390c.
Atropos, 2141c.
Attaché, 466b.
Attachment, 466b.
Attainder, 466c.
Attar of roses, 466d, 990b.
Attention, 467a, 3729c, 6288a.
Attica, 318a, 468c.
Attic period of sculpture, 5273d.
Attila, 469a, 3381b.
Attleboro, Mass., 469b.
Attorney-general, 469c.
Attraction, 469c.
Attucks, Crispus, 4985a.
Auburn, Me., 469d.
Auburn, N. Y., 470b.
Auckland, N. Z., 470c.
Auction, 470d.
Auction bridge, 924d.
Auditor, 471a.
Auditory canal, 1898c, 1899b.
Auditory memory, 3729d.
Auditory nerves, 4121a.
Audubon, John James, 471c.
Audubon Society, The, 471b.
Audubon sugar school, 3522b.
Augean stables, 471d.
Auger, 472a, 842c.
Augite, 4880a.
Augsburg, Bavaria, 472a.
Augsburg, Peace of, 1277b.
Augsburg Confession, 472b.
Augurs, 472c.
August, 472b.
Augusta, Ga., 475b.
Augusta, Me., 475d.
Augusta Canal, 1147a.
Augustan Age, 265a, 476b, 2057a.
Augusta natural bridge, 4077d, 6013a.
"August City," 4551d.
Augustine, Saint, 476b.
Augustine, Saint (Aurelius Augustinus), 476c.

Augustinian hermits, 3883d.
Augustinians, 3732d.
Augustus (Caius Julius Caesar), 476d.
Auk, 477d.
*Auld Lang Syne*, 478b.
Aurelian, 478c, 6410d.
Aurelius, Marcus, 478c.
Aurelius Augustinus, 476c.
Auric chloride, 2524a.
Auricle, 1898c.
Auricle of heart, 7c, facing 1388, 2746a.
Auriga, 479a.
Aurora (mythology), 479b, 4048c.
Aurora, Ill., 479c.
Aurora, Ont., 480a.
*Aurora, The*, 4450.
Aurora australis, 480b.
Aurora borealis, 480b
Aurum, 2523d.
Auruncans, 3342c.
Ausable Chasm, 480d.
Ausgleich, 505d, 2874a
Aussenalster, 2673c.
Austen, Jane, 480d.
Austerlitz, 481b.
Austin, Alfred, 482a.
Austin, Saint, 476b.
Austin, Stephen Fuller, 482c.
Austin, Tex., 481b.
Australasia, 4336b.
Australia, 482b.
Australian Alps, 4183b, 6078b.
Australian ballot, 495b.
Australian bear, 3273c.
Australian bottle-tree, 866a.
Australian crawl, 5657c.
Australian current, 4334c.
Australian Henley, 5093b.
Australian realm, 6416a.
Australian rubies, 5101a.
Australian sumac, 5622b.
Austria, 496d.
Austria-Hungary, 500a, 6153b.
Austria-Hungary, Flag of, 2198b.
Austrian ducat, 2523b.
Austrian mile, 3796c.
Austrian national hymn, 2983d.
Austrian Succession, War of the, 2330a, 5610a.
Austro-Hungarian army, 385b.
Auszug, Swiss, 5662c.
Authorized Version of Bible, 705b, 3107c.
Autocratic government, 2546d.
*Autocrat of the Breakfast Table*, 229b, 510c.
Autograph, 510d.
Auto-intoxication, 511c.
Automatic mines, 5605b.
Automatic pistol, 4990b.
Automatic restaurants, 5408c.
Automatic telephone, 5740a.
Automatic valve, 6025d.
Automatic writing, 4858d, 5599a.
Automaton, 511d.
Automobile, 512a, 1777b, 3405d, 4761a, 4909a.
Automobile tires, 4716a.
Autonomy, 518d.
Autumnal equinox, 2067c.
*Autumn Fires*, 3322a.
Autumn stories, 5573c.
Auxiliary verbs, 6056c.
Avalanche, 518d.
Avalanche Lake, 2503b.
Avalon, 398d.
Avalon Peninsula, 4152b.
*Ave Maria*, 255b, 519a.
Avenger of blood, 776d.
Aventine Hill, 5064a.
*Avenue at Middleharnis*, 4450.
Average death rate, 3958a.
Avernus, 519b.
Aversion, 6287a.
Avesta, 6410b.
Avignon, 285b, 4629a.
Avocado, 206a.
Avocet, 519c.
Avoirdupois, 519d, 1765c, 4802c.
Avon, 519d.
Axial skeleton, 5398d.
Axiom, 520a, 2445c.
Axis, 520a.
Axminster rug, 1199d.
Axolotl, 5169c.
Ayacucho, Battle of, 4603c.
Ayacucho, Peru, 4600d.
Aye-aye, 520c.
Ayin, 4322a.
Aylesworth, Sir Allen Bristol, 520d.
Aylmer, Lake, 2599b.
Aylmer, Que., 521a.
Aylmer West, Ont., 521a.
Ayr, Scotland, 521b.
Ayres scale, 1936b.
Ayrshire cattle, 1235d.
Azalea, 522a.
Azazel, 5231a.
Azoic Era, 522b.
Azores Islands, 522c, 4782a.
Azov, Sea of, 522d.
Aztec idol, 2914d.
Aztecs, 522d.
Azurite, 3817d.

# B

B, 524a.
Baader, Benedict Franz Xavier von, 524a.
Baal, 524b, 4644d.
Babbage, Charles, 4391b.
Babbitt metal, 524d.
Babcock, Orville E., 6269a.
Babcock, Stephen M., 3804a.
Babcock test, 3804a.
Babel, Tower of, 524d.
Bab-el-Mandeb, 53a, 525a.
Baber, 3889d.
*Babes in the Woods*, 525b.
Babine Mountains, 5398c.
Babirussa, 525b.
Baboon, 525c.
Baby, 526a.
Baby beeves, 1237b.
Babylon, 532a, 4108a.
Babylonia, 532b.
Babylonian Captivity, 4107d.
"Babylonish captivity," 4629a.
Babyrussa, 525b.
Bacaba palm, 4463a.
Bacchanalia, 534c.
Bacchantes, 534d.
Bacchus, 534c.
Baccio Della Porta, 603b.
Bach, Johann Sebastian, 534d.
Bacheller, Irving, 535b.
Bachelor Mountain, 4403b.
Bachelor's button, 535b, 3198b.
Bacillus, 537c.
Backgammon, 535c.
Back stroke, 5657b.
Back swimmers, 6214d.
Bacon, 535d.
Bacon, Francis, 536a, 4642b.
Bacon, Josephine Dodge Daskam, 536c.
Bacon, Nathaniel, 537b.
Bacon, Roger, 536d, 2641d.
Bacon's Rebellion, 537b.
Bacteria and bacteriology, 537c.
Bacterial diseases, 1806b.
Bacterial therapeutics, 5785b.
Bactrian camel, 1078d.
Bacubirito meteorite, 3755c.
Bad breath, 913d.
Bad Ems, Prussia, 2029b.
Baden, Austria, 539c.
Baden, Grand Duchy of, 539d.
Baden-Baden, Germany, 539c.
Baden Bei Wien, Austria, 539c.
Baden-Powell, Robert Stevenson Smith, 540b.
Badger, 540c.
Badger State, 6329a.
Bad Lands, 540d.
Bad Lands of South Dakota, 4102a, 5464b.
Badminton, 627d.
Bad money drives out good, 2623a.
Baeda, 645c.
Baedeker, Karl, 541a.
Baffin, William, 541b.
Baffin Land and Baffin Bay, 541b.
Bagasse, 5615a.
Bagatelle, 541d.
Bagdad, Mesopotamia, 541d.
"Bagdad-on-the-Hudson," 4205a.
Bagdad railway, 542b.
Bagot, Sir Charles, 542c.
Bagpipe, 542d.
Baguio, P. I., 4635c.
Bahama Islands, 543a.
Bahia, Brazil, 543c.
Bahia Blanca, Argentina, 544a.
Bahia da Lagoa, 4767c.
Bahia da Roca, 4767c.
Bahrein Islands, 4596c.
Bahr Lut, 1717d.
Baikal, Lake, 544b.
Bail, 544c.
Bail bond, 808d.
Bailey, Liberty Hyde, 544c.
Bainbridge, William, 544d.
Baird Mountains, 137a.
Baireuth, Bavaria, 631c.
Bait, 257d.
Baja California, 1070c.
Ba-kalaharis, 3199a.
Baker, Mount, 6187c.
Baker, Sir Samuel White, 545a.
Bakersfield, Cal., 545b.
Baker's flour, 2222c.
Baker's itch, 3087a.
Baker's yeast, 6386b.
Baking, 1566c.
Baking powder, 545c.
Baking soda, 5429b.
Baku, Russia, 545d.
Balaam, 546a.
Balaklava, Battle of, 4235d.
Balaklava, Russia, 546b.
Balance, 546d.
Balance, The (astronomy), 3402a.
Balance of power, 547b, 1637c.
Balance of trade, 547d.
Balancer for cars and automobiles, 2650d.
Balance scale, 6241a.
Bala-Rama, 3180d.
Balboa (coin), 1468a.
Balboa, Vasco Nunez de, 548b.
Bald cypress, 1682b.
Bald eagle, 1897c.
Balder, 548c.
Baldness, 548c.
Baldpate duck, 1873d.
Baldpate widgeon, 6281b.
Bald wheat, 6262b.
Baldwin, Curtis C., 5800c.
Baldwin, Matthias William, 549a.
Baldwin, Robert, 549c, 4735d.
Baldwin locomotive, 4919b.
Baldwin Locomotive Works, 549c.
Baldwin of Flanders, 1032b, 1652c, 2487c.
Baldy, Mount, 4172b.
Balearic Isles, 550c.
Baleen, 1257b.
Balfe, Michael William, 550c.
Balfour, Arthur James, 550d.
Baliol, 551d.
Balkan Mountains, 552d.
Balkan Peninsula, 551d.
Balkan Wars, 552d, 6152a, 6153c.
Balkash, Lake, 556b.
Ball, Mary, 6199d.
Ball, Thomas, 556b, 5277b.
Ballad, 557a.
Ball-and-socket joints, 3167c.
Ballarat, Australia, 557d.
Ballard, Harlan H., 90b.
Balleny Islands, 4728c.
Ballet, 558a.
Ballinger, Richard A., 5684b.
Ballinger - Pinchot controversy, 5684c.
Balliol College, 551d.
Ballistite, 5417c.

Ball lightning, 3429c.
Balloon, 558b.
Ballooning spider, 5498a.
Ballot, 560c.
Balm, 561b.
Balmat, Jacques, 3911a.
Balm of Gilead, 561c, 4759d.
Balsam, 561c.
Balsam fir, 2177d.
Balsam fir cone, 1527b.
Baltic Sea, 561d.
Baltimore, Sir George Calvert, 562c.
Baltimore, Md., 562b.
Baltimore oriole, 564d.
Baluchis, 565c.
Baluchistan, 565b, 804b.
Balzac, Honoré de, 565d.
Bamboo, 566c, 1342a.
Ban, 567b.
Banak Indians, 5361b.
Banana, 567c.
Bancroft, George, 569a.
Bancroft, Hubert Howe, 569c.
Band, 569d.
Banda, 3881c.
Bandage, 570d.
Banded pickerel, 4661b.
Banded purple butterfly, facing 1022.
Banderillero, 994a.
Bandicoot, 571b.
Bandicoot rat, 571c.
Bandit, 571c.
Band saw, 5227c.
Banff, Alta., 571d, 5045d.
Bangalore, India, 572a.
Bangkok, Siam, 572b.
Bangor, Me., 572c.
Bangs, John Kendrick, 573a.
Bangweolo Lake, 77d, 1535c.
Bania, 573c.
Banian, 586b.
Banishment, 2113a, 4422d.
Banjo, 573b.
Bank account, Value of, 2819d.
Bank discount, 1802c.
Bankers (boats), 2559b.
Banking in Canada, 582c.
Banking reform, 580c.
Bank of England, 573c.
Bank of North America, 579b.
Bank of the United States, 574a, 5925b.
Bank plum, 4710b.
Bankrupt, 575a.
Banks, Nathaniel Prentiss, 585b.
Banks, Savings, 5225b.
Banks, Thomas, 5276d.
Banks and banking, 576b.
Banks Land, 4280b.
Bank vole, 6112c.
Bannockburn, 585c.
Banns of marriage, 585d, 3660c.
Ban-Pa Kong River, 5367a.
Banquo, 3551a.
Bantu, 586a.
Banyan, 586b.
"Banyan City," 2345c.
Baptism, 586c.
Baptism in the Roman Catholic Church, 5052a.
Baptists, 242b, 587a.
Baptist Young People's Union, 587a, 1367c.
Baquet, 2896d.
Barabbas, 587b.
Baradaeus, Jacobus, 3103b.
Barak, 1724a, 5674d.
Baranof Island, 135d, 5395d.
Barbados earth, 4912b.
Barbados Island, 587b.
Barbados leg, 2007b.
Barbara, Saint, 587c.
Barbara Frietchie, 587d.
Barbarelli, Giorgio, 2496c.
Barbarian, 588a, 1398a, 2601a.
Barbarossa, 2321c.
Barbary states, 588b, 3134b.
"Barb City," 1742b.
Barbecue, 589a.
Barbed wire, 6319c.
Barber, 589a.
Barberini vase, 1080a.
Barberry, 589c.
Barbers itch, 589b.
Barberton, Ohio, 589c.
Barbizon Painters, 589d.
Barbour, Ralph Henry, 590a.
Barbs of feather, 2144b.
Barca, Calderon de la, 5472c.
Barcelona, Spain, 590b.
Barclay, Robert, 2070b.
Bard, 590c.
Barebones Parliament, 590d.
Barents, William, 5503b.
Barents Island, 5503b.
Bar Harbor, Me., 590d, 3603b.
Bari, Italy, 591a.
Baring, Edward, 4981b.
Baring-Gould, Sabine, 2895d.
Barium, 591b.
Bark, 591d, 5871b.
Barker's mill, 592b.
Bark grafting, 2551c.
Barking wolf, 6343d.
Barkley Sound, 6032d.
Bark louse, 5229d.
Bark stove houses, 2617c.
Barley, 592d.
Barlow's disease, 5277d.
Bar magnet, 2001a.
Barmecide's feast, 593c.
Barmen, Germany, 593d.
Barn, 593d.
Barnabas, 594d, 4529b.
Barnacle, 594d.
Barnacle goose, 595b.
Barnard, Frederick Augustus Porter, 595b.
Barnard, George Grey, 595c.
Barnard, Henry, 596b.
Barnard College, 596c.
Barnegat, N. J., 3427b.
Barn swallow, 5643b.
Barnum, Phineas Taylor, 596d, 3449a.
Barnyard manure, 3639a.
Barnyard millet, 3807d.
Baroda, India, 597b.
Barometer, 597b.
Baron, 598b, 4550a.
Baronet, 598c.
Barr, Amelia Edith Huddleston, 598d.
Barr, Robert, 599a.
Barrack emperors, 5061b.
Barrada River, 1693c.
Barranquilla, Colombia, 599b, 1480b.
Barras, Paul Francois Jean Nicholas, Count de, 599c, 4063c.
Barre, Vt., 599d.
Barrel, 600a.
Barrel organ, 2683b.
Barrel vault, 6041c.
Barrett, Elizabeth, 957a.
Barrie, Sir James Matthew, 600d.
Barrett, John, 4476c.
Barrett, Lawrence, 600c.
Barrie, Ont., 601b.
Barrier Reef, 601c, 1577b, 4899c.
Barrier, Treaty of 1715, 6017d.
Barrister, 601d.
Barron, James, 602a.
Barron Strait, 4280a.
Barrymore, Ethel, 602b.
Barrymore, John, 602b.
Barrymore, Lionel, 602c.
Barter, 602c, 1511a.
Bartholdi, Frederic A., 3400d.
Bartholomew, 602c.
Bartholomew Island, 2630a.
Bartholomew's Day, Massacre of, 5145c.
Bartlett, Josiah, 235a.
Bartlett, Paul Wayland, 602d.
Bartlett, Robert A., 4725d.
Bartlett pear, 4542c.
Bartolini, Lorenzo, 5275d.
Bartolommeo, Fra, 603b.
Barton, Clara, 603c, 4952b.
Barye, Antoine, 5276b.
Barytone, 5390d.
Basalt, 604a.
Basaltes, 6237d.
Bascule bridge, 923b.
Base, 604a.
Baseball, 604b.
Basel, 610a.
Base line, 610b.
Basil, Order of Saint, 459d.
Basil, Saint, 3883c.
Basilica, 610b.
Basilica, Christian, 326a.
Basilic vein, facing 1388.
Basin, 610c.
Basin of Minas, 3814d.
Basket ball, 610d.
Basketry, 613a.
Basketry, Indian, 2965a.
Basking shark, 5337d.
Basque, 617b, 5472a.
Bas-relief, 617c.
Bass, 617d.
Bassalian fishes, 6416b.
Bassano, Alta., 618b.
Bass clef, 4022d.
Bass drum, 1865d.
Basse-Terre (Guadeloupe), 2630a.
Basse Terre, West Indies, 5147d.
Bassoon, 618c.
Bass viol, 618c, 6088c.
Bass voice, 5390d.
Basswood, 619a, 3449a.
Bastard balm, 561c.
Bastien-Lepage, 619b.
Bastille, 619c, 3185c.
Basutoland, 620a, 1167b.
Bat, 620b.
Batangas, P. I., 620d.
Batavi (tribe), 4128a.
Batavia, Java, 621a.
Batavia, N. Y., 621b.
Bates, Arlo, 621c.
Bates, Blanche, 621d.
Bates, Captain, 2489c.
Bath, England, 621d.
Bath, Knights of the, 622a.
Bath, Me., 622c.
Bathing, 3416a.
Bathing beaches, 623a.
Bath itch, 3086a.
Baths and bathing, 622b.
Baths of Caracalla, 625b.
Bath sponge, 5506d.
Baton Rouge, La., 625c.
Batoum, Russia, 628b.
Batoum tree, 4684b.
Bat-parrot, 4512d.
Batrachia, 626b.
Battalion, 381a, 626b.
Battenberg (family), 626c.
Battering-ram, 626d.
Battery (military), 381a.
Battery, Electric, 1980d, 3398a.
Battery Park, 4207c.
Battle, Trial by, or Wager of, 627a.
Battle Creek, Mich., 627b.
Battledoor and shuttlecock, 627c.
Battlefields National Park, 4507a, 4897c.
Battleford, Sask., 628a.
*Battle Hymn of the Republic*, 628a, 2855c.
Battle Monument (Quebec), 4897b.
*Battle of Blenheim*, 768a.
*Battle of Bunker Hill*, 4450.
*Battle of Ivry*, 2772c.
*Battle of Lake Erie*, 2070c.
"Battle of the Nations," 4066c.
Battleship, 6180b.
Battleship, Modern, 6183b.
Batum, Russia, 628b.
Baucis and Philemon, 628c.
Bauxite, 218b, 628d.
Bavaria, 628d, 4457c.
Bavarian Palatinate, 4457c.
Bavarian Succession, War of the, 5601d.
Baya, 6233a.
Bayard, Pierre du Terrail, 630a.
Bayard, Thomas Francis, 630a.

Bayard of India, 4431d.
Bayberry, 1152d.
Bayberry tree, 207d.
Bay City, Mich., 630c.
Bayeux Tapestry, 630d.
Bayonet, 631a.
Bayonne, N. J., 631b.
Bayou State, 3844a.
Bayreuth, Bavaria, 631c.
Bay rum, 631d.
Bay shilling, 4680d.
Bay tree, 632a.
Bazar, 632a.
Beach, Rex, 632b.
Beachy Head, 3426c.
Beacon, N. Y., 632c.
Beacon Hill, 845d.
Beaconsfield, Earl of, 1807c.
Beads, 632d.
Beagle expedition, 1705d.
Beaks, 735a.
Beak shell, 5344a.
Beam, 633a.
Bean, 633c.
*Bean-bag game*, 2377b.
Bean bags, Games with, 2376a.
Beanes, William, 5532d.
Bean trefoil tree, 3288c.
Bear, 634b.
Bear, Great, 637c.
Beard, 638a.
Beard, Daniel Carter, 638b.
Beardless wheat, 6262a.
Bear Driver, 332a.
Bear Mountain, 1545d.
Bear River, 6011c.
Bears and bulls, 638c.
Bear's head mushroom, 4014d.
Bear State, 363b.
*Beast, bird or fish* (game), 2378c.
"Beast Butler," 1016b.
Beatrice, Neb., 639a.
*Beatrice Cenci*, 4450.
Beatrice Portinari, 639b.
Beatty, Louise Dilworthy, 2822a.
Beau Brummell, 960b.
Beauclerc, 2769c.
Beaufort Canal, 1147a.
Beauharnais, Alexandre, 3175b.
Beauharnais, Eugene, 3175b.
Beauharnais, Josephine De, 4063c.
Beaumarchais, Pierre Augustin Caron De, 639c.
Beaume's hydrometer, 2889d.
Beaumont, John, 6102a.
Beaumont, Francis, 640a.
Beaumont, Tex., 639c.
Beauregard, Pierre Gustave Toutant, 640b.
*Beautiful Joe*, 5223b.
Beaver, 640c.
Beaver Dam, Battle of, 5288b.
Beaver Falls, Pa., 642d.
Beaver hat, 2712d.
Beaver Island, 3790c.
Beaver Lake, 5211b.
Beaver State, 4402a.
Bebel, Ferdinand August, 643a.
Bechuanaland Protectorate, 1167b.
Beck, Sir Adam, 643b.
Becket, Thomas à, 643c.
Becket hitch, 5504b.
Becky Sharp, 643d.
Becquerel, Henri, 4911d.
Becquerel rays, 4912a.
Bed, 644a.
Bed (geology), 645b.
Bedbug, 281d, 645b.
Bede, 645c.
Bedeque Bay, 4818b.
Bedford, Ind., 645d.
Bedford Basin, 2666d.
Bedlam, 646b.
Bedloe's Island, 646c, 3400b.
Bed of the ocean, 4332c.
Bedouins, 646c.
Bedroom decoration (color plate), facing 3015.
Bee, 647a.
Bee balm, 561b.
Beech, 657a.
Beecher, Henry Ward, 657c.
Beef, 658a.
Beef peptones, 4579c.
Beef tea, 658c.
Beef type cattle, 1234d.
Beehive, 649d.
Bee-keeping, 652b.
Beelzebub, 659a.
Beer, 169c, 659a, 3415b.
Beer, Jakob Meyer, 3777b.
Beersheba, 659b.
Beer yeast, 6386b.
Beeswax, 659c, 6227a.
Beet, 659c.
Beethoven, Ludwig von, 660b.
Beetle, 661a.
Beetleweed, 1497b.
Beet sugar, 5615b.
Beggars' button, 1002b.
Begin, Louis Nazaire, 662c.
Begonia, 662d.
Behistun Rock, 1671a.
Beira, P. E. I., 4785b.
Beirut, Turkey, 663a, 5910d.
Bel, 524b.
Belasco, David, 663b.
Belem, Brazil, 663c, 4483a.
Belfast, Ireland, 663d.
Belgae, 670d, 4128a.
Belgian Congo, 1534a.
Belgian hare, 2689b, 4907a.
Belgica, 1440d.
Belgium, 664a.
Belgium, Flag of, 2198b.
Belgian neutrality, Violation of, 6155d.
Belgrade, Serbia, 675c.
Belisarius, 1205d, 6033d.
Belize, Honduras, 675d, 944a.
Belknap, Mount, 6185c.
Belknap, William W., 2570d, 2936a.
Bell, 676a.
Bell, Alexander Graham, 677c, 1720a, 5741b.
Bell, A. Melville, 1720a.
Bell, Sir Charles, 4659a.
Bell, Electric, 1983b.
Bell, John, 678a.
Bell, Robert, 678b.
Bellacoola, 678c.
Belladonna, 678c.
Belladonna lily, 220c.
Bellaire, Ohio, 679a.
Bellbird, 679c.
Bell buoy, 1000c.
Bellefontaine, Ohio, 679d.
Belle Isle, Strait of, 681d.
*Belle Jardiniere*, 3586c.
Belle of Georgia peach, 4538d.
Bellerophon, 680a.
Belles-lettres, 680b.
Belle Thistlewaite, 6259a.
Belleville, Ill., 680c.
Belleville, Ont., 680b.
Bellingham, Wash., 680d.
Bellingshausen, Fabian, 4728b.
Bellini, Giovanni, 681b.
Bellini, Jacopo, 4449a.
Bellman, Karl, 5645d.
Bellows, 681d.
Bell Rock, 3426b.
Bell-Smith, Frederick Marlett, 682a.
Bell telephone, First, 5741b.
Bell Telephone Company, 5742a.
Bell tent, 5758b.
Belltown, W. Africa, 3201a.
Belly River, 5217d.
Belmont, August (1816-1890), 682b.
Belmont, August (1853- ), 682c, 1166c.
Beloit, Wis., 682c.
Belshazzar, 682d.
Belt, 682d.
Belted kingfisher, 3257b.
Belting, 682d.
Belt of equatorial calms, 6310a.
Beluchistan, 565b.
Beluga, 5596a.
Bemis Heights, Battle of, 5206a.
Benares, India, 683b.
Bench warrant, 6179b.
Bencoolen, Sumatra, 5622d.
Ben Davis apple, 297d.
Benedict (Popes), 683c.
Benedict, Saint, 3883c.
Benedictines, 684c, 4756c.
Benefit associations, 2318b.
Benefit of clergy, 684d.
Benefits of good roads, 5030b.
Benet-Mercie gun, 3563b.
Bengal, 685a.
Bengal, Bay of, 685d.
Bengali, 686a.
Benghazi, Tripoli, 5881d.
Bengough, John Wilson, 686a, 1143d.
Benguela current, 4334c.
Ben-Hur, 686b, 5199c.
Benign tumor, 5900a.
Benjamin (Bible), 686c, 3173d, 4910b.
Benjamin, Judah Philip, 686d.
Benjamin F. Johnson, of Boone, 5019b.
Benjamites, 686c.
Ben Lomond, 686d.
Ben Lui, 5716b.
Ben Macdhui, 2557c.
Bennett, Arnold, 687c.
Bennett, James Gordon, 687a.
Bennett, James Gordon, Jr., 687b.
Bennett, Lake, 6404b.
Ben Nevis, 687c.
Bennington, Battle of, 687d.
Bennington, Vt., 687d.
Bennington battle monument, 6065c.
Benton, Thomas Hart, 688a.
Benton Harbor, Mich., 688c.
Benue River, 4233c.
Benzene, 688d.
Benzine, 689a.
Benzoate of soda, 689a.
Benzol, 688d.
*Beowulf*, 689b.
Berar, India, 3588a.
Berar Provinces, 804b.
Berbera, Somaliland, 5438d.
Berbers, 196a, 689b.
Berea College, 689c.
Berea sandstone, 5189a.
Beresford, Lord Charles William de la Poer, 689d.
Bergamot, 690a, 3838b.
Bergen, Norway, 690a.
Bergen Hill, 3140c.
Bergh, Henry, 690b.
Bergson, Henri Louis, 690c.
Beri beri, 61a.
Beriberi-kakke, 5007d.
Bering, Vitus, 691b.
Bering Island, 691a.
Bering Sea, 690d.
Bering Sea controversy, 691c.
Bering Strait, 691a.
Berkeley, Cal., 692a.
Berkeley, Sir William, 691d, 6099b.
Berkshire Hills, 692c.
Berlin, Congress of, 695d.
Berlin, Germany, 692b.
Berlin, N. H., 696b.
Berlin, Ont., 3261c.
Berlin, University of, 695c.
Berlin Decree, 1562d.
Berliner, Emile, 696c.
Berlin-Stettin Canal, 1147b.
Berlioz, Hector, 696d.
Bermuda grass, 2576c.
Bermuda Islands, 697a.
Bermudez, Juan, 697b.
Bermudez, Lake of, 6048d.
Bermudez asphalt, 425c.
Bern, Switzerland, 697c.
Bernadotte, 5651a.
Bernard, Saint, 697d.
Bernhardt, Rosine, 698a.
Bernini, Lorenzo, 5275c.
Bernstorff, Johann Heinrich, Count, 699a, 6173a.

Berossus, 5629a.
Bersaglieri, 699b.
Bertillon, Alphonse, 699d.
Bertillon system, 699c.
Berwich, Mary, 4831c.
Beryl, 699d.
Besant, Sir Walter, 700a.
Bessarabia, 700b.
Bessemer, Ala., 700d.
Bessemer, Sir Henry, 700c
Bessemer steel, 5542b.
Betel, 701b, 4463a.
Betel chewing, 701c.
Betelgeux, 446b.
Beth, 524c.
Bethel, 701c.
Bethlehem, 701d.
Bethlehem, Pa., 701d.
Bethman - Hollweg, Theobald Theodore von, 702a.
Bethsaida, Palestine, 4627c.
Betle, 701b.
Betsy Ross flag, 2195b.
Betsy Ross house, 4622b.
Better babies conferences, 531a.
"Better-farming" train, 5213b.
Beveled gearing, 2410c.
Beverly, Mass., 702c.
Bewick's swan, 5644a.
Bewick's wren, 6361d.
Bewitchment, 6339d.
Beyrout, Turkey, 663a.
Bhamo, India, 3063d.
Bhils, 2943a.
Bhutan, 702d.
Biafra, Bight of, 2637c.
Bias, 5318d.
Bible, 703a.
Bible Communists, 4376d.
Bible of Cromwell, 1617b.
Bible schools, 5627d.
Biblical chronology, 708a.
Bibliography, 710c.
Bibliomania, 710d.
Bibliotheque Nationale, 711b.
Biceps, 711c, 4011b.
Bichloride of mercury, 281d, 286b, 1596d.
Bicuspid teeth, 5728c.
Bicycle, 711d.
Bicycle racing, 4908c.
Biddeford, Me., 713c.
Biennials, 267b, 714a.
Biennial weeds, 6239a.
Bienville, Jean Baptiste Le Moyne, 714a, 4180b.
Bierstadt, Albert, 714b.
Bigamy, 714c.
"Big Ben," 676d.
Big Bend State, 5748a.
Big Bethel, Battle of, 4266c.
Big Bone Cave, 5754d.
Big Dipper, 443c, 637d.
Bigelow, Erastus, 1199a.
Bighorn, 714d.
Bighorn River, 715a.
Bight, 5504a.
*Biglow Papers*, 715b.
"Big Muddy" River, 3864c.
Bignonia, 715b.
Big Quill Lake, 5211b.
Big Sandy River, 6253d.
"Big Stick" policy, 3902b.
Big Stone Lake, 5464d.
Big trees, 5309b.
Bilbao, Spain, 715c.
Bilbos, 715d.
Bildad, 3154b.
Bile, 715d.
Bill, 716a.
Bill becomes a law, How a, 3350a.
Billboard, 716c.
Billed marsh wren, 6361d.
Billiards, 717a.
Billings, John S., 2753a.
Billings, Josh, 5339d.
Billings, Mont., 718a.
Billingsgate, 2041a.
Bill Nye, 4321a.
Bill of attainder, 718b.
Bill of exchange, 718b.
Bill of health, 718d.
Bill of indictment, 716c.
Bill of lading, 719a.
Bill of Rights, 719c, 1561a, 4508a.
Bill of sale, 719d.
Bills of fare, Typical, 4319c.
Biloxi, Miss., 720a.
Bilskirnir, 5796b.
Biltmore, 410c.
Biltong, 4556b.
Bimetallism, 720c.
Binary color, 1483c.
Binary system, 441a, 1844b.
Binder twine, 721a.
Bindweed, 721b.
Binet-Simon method, 3007d, 3738d.
Bingen, Germany, 721d.
Binghampton, N. Y., 722a.
Binnenalster, 2673c.
Binocular, 3792b.
Binomial, 722c.
Biochemistry, 1298b.
Biogenesis, 722c.
Biogeography, 2426d.
Biography, 722b.
Biology, 727b, 6417a.
Biological Survey, Division of, 106c.
Biotite, 3778b.
Biplane, 2237d, 2238b.
Birch, 727c.
Bird, 729a.
Bird day, 746a.
Bird day, Program for, 743a.
Bird houses, 736d.
Bird reservations, 742a.
Birds, Ages of, 3419b.
Bird's-eye maple, 747b, 3642d.
Bird's-foot trefoil, 5873a.
Bird's-foot violet, 6088d.
Birds of paradise, 747c.
Bireme, 2365d.
Biretta, 1182d.
Birkenfeld, Principality of, 4367b.
Birkenhead, England, 748d, 3748c.
Birmingham, Ala., 749a.
Birmingham, England, 749d.
Birney, James G., 3401c, 4738d, 5985b.
Birney, Mrs. Theodore W., 4074a.
Birthdays of famous people, 750b.
Birth rate, 4761b.
Birth registration, 4962d.
Birthstones, 750b.
Birthwort, 5420b.
Bisbee, Ariz., 750c.
Biscay, Bay of, 751a.
Biscayne Bay, 3777d.
Bishop, 751b.
Bismarck, N. D., 751b.
Bismarck Archipelago, 751d.
Bismarck - Schonhausen, 752a, 6292b.
Bismuth, 753d.
Bison, 981d.
Bissayos Islands, 4785c.
Bistre, 5441b.
Bit and brace, 842c.
Bite of a mosquito, 3966c.
Bithynia, 754a.
Bitter candytuft, 1154c.
Bitter cassava, 5700b.
Bittern, 754c.
Bitternut, 755a.
Bitterroot, 755b.
Bitter Root Range, 3904b.
Bitters, 755c.
Bitter spar, 1834d.
Bittersweet, 755c.
Bitumen, 755d.
Bituminous - bound macadam, 5029b.
Bituminous coal, 1443b.
Bivalve mollusks, 3880b.
Bivalve shell, 5344b.
Bizarre tulips, 5899a.
Bizet, Georges, 755d.
Björnson, Björnstjerne, 756a.
Blaaubok, 278d.
Black, 756c.
Black alder, 6318a.
Black alkali, 202b.
Black and tan terrier, 5763d.
Black and white creeping warbler, 6137a.
Black art, 4109a.
Black ash, 409d.
Black-backed gull, 2640c.
Blackball, 560d.
Black bear, 637c.
Black-bellied plover, 4708b.
Blackberry, 756d.
Blackberry jam, 757a.
Blackbird, 757b.
Black bread, 5132a.
Black Brother Mountain, 4260d.
Blackburn, England, 757d.
Blackburnian warbler, 6136d.
Black-capped chickadee, 5821c.
Black cockatoo, 1454c.
Black-crowned night heron, 4234d.
Black death, 4694a.
Black Diamond State, 4572c.
Black-eyed Susan, 758a, facing 2224 (color plate).
Blackfeet project, 3905d.
Blackfoot Indians, 758b, facing 2970.
Black Forest, 758c.
Black Friday, 758d.
Black gum, 759a.
Black haw, 759a.
Black Hawk, 759b.
Black-headed gull, 2640c.
Blackheads, 5401a.
Black Hills, 759d.
Black Hole of Calcutta, 760a.
Blacking, 760a.
Black Lake, Que., 760b.
Blacklist, 760b.
Black locust, 2827a.
Blackmail, 760d.
Black maple, 3643a.
Black measles, 3709d.
Black mold, 3876d.
Black Monday, 3885a.
Blackmore, Richard Doddridge, 760d.
Black Mountains, 761a, 4260d.
Black mulberry, 3996c.
Black mustard, 4037c.
Black-necked stilt, 5553d.
Black-necked swan, 5644a.
Black oak, 4323c.
Black patch, 3225d.
Black peat, 4545c.
Black pepper, 4578d.
Black persimmon, 4596d.
Black pine, 4677d.
Black poll warbler, 6137a.
Black Prince, The, 1958b.
Black raspberry, 4932b.
Black rat, 4932b.
Black rhinoceros, 4995a.
Black River Canal, 1147a.
*Black Rock*, 2537d.
Black Rock Channel Canal, 1147a.
Black rot, 2574b.
Black Sea, 761b.
Blacksmiths' vises, 6102b.
Black snake, 761d.
Black snakeroot, 5420b.
Blackstone, Sir William, 761d.
Blackstone River, 4997b.
Black Stream of Japan, 4443a.
Black sumac, 5622a.
Black swan, 5644a.
Black tea, 5723c.
Black vulture, 6118c.
Blackwall hitch, 3270a.
Black walnut, 6130d.
Blackwell, Elizabeth, 762a.
Blackwell's Island, 762b.
Bladder, 7d.
Bladderwort, 762c.
Bladder wrack, 184a.
Blaen, William, 4825a.
Blaine, Mrs. Emmons, 4501d.
Blaine, James Gillespie, 762c, 2700b.
Blair, Francis P., 2679c.

Blairmore, Alta., 763b.
Blake, Edward, 763c.
Blake, Francis, 5742a.
Blake, Robert, 764a.
Blake, William, 764b.
Blanc, Mont, 3910d.
Blanc-mange, 764c.
Bland, Richard Parks, 764c.
Bland-Allison Act, 764c, 2698c, 2732a.
Blank cartridge, 1208d.
Blanket stitch, 5326d.
Blanket wool, 6354c.
Blank verse, 764d.
Blarney Castle, 765b.
Blarney stone, 765a.
Blashfield, Edwin Howland, 765b.
Blasphemy, 765c.
Blast furnace, 765d.
Blasting, 765d.
Blau gas, 2402c.
Blavatsky, Helena Petrovna Hahn-Hahn, 766a, 4331c.
Bleaching, 766b.
Bleaching powder, 1358c.
*Bleak House*, 1508d, 1789d.
Bleeding, 767a.
Bleeding heart, 767c, 6129d.
Blenheim, Battle of, 2167d.
Blenheim, Bavaria, 768a.
Blenheim spaniel, 5479d.
Blennerhassett, Harman, 768b.
*Blessed Damozel* (painting), 4450.
*Blessed Damozel, The* (poem), 5085c.
Blewett, Jean McKishney, 768c, 1143c.
Blight, 768d.
Blind, Education of the, 770b.
Blind arcade, 317d.
Blindfish, 772b.
Blindness, 768b.
Blind spot, 2118d.
"Blind Tom," 3728b.
Blindworm, 2510b.
Bliss, Tasker H., 772c.
Blizzard, 772d.
Blockade, 773a.
Block and tackle, 773b.
Block game, 1840b.
Blockhouse, 774a.
Blockhouse, Pittsburgh, 4690a.
Block Island, 4997b.
Bloemfontein, Orange Free State, 774b.
Blondel, 774c.
Blondin, 774d.
Blondin, Pierre Edouard, 775a.
Blondlot, 4308c.
Blood, 775a.
Blood, Avenger of, 148a, 776c.
Blood-flower, 220c.
Bloodhound, 776d.
Blood money, 777b.
Blood orange, 4394b.
Blood poisoning, 776a.
Blood pressure, 391c.
Bloodroot, 777b, 4760c.
Blood-stanch, 2207a.
Bloodstone, 2763d.
Bloodsuckers, 3369c.
Blood sweat, 2800c.
Bloomer, Amelia, 1861d.
Bloomfield, N. J., 777d.
Bloomfield-Zeisler, Fannie, 6409d.
Bloomington, Ill., 778a.
Bloomington, Ind., 778c.
Blouet, Paul, 4410d.
Blount, William, 2935d.
Blouse, 5327b.
Blowfish, 4584a.
Blowfly, 778d.
Blowing machine, 779a.
Blowing well, 4102b.
Blowpipe, 779c.
Blubber, 779d, 6260c.
Blücher, Gerhard Lebrecht von, 780a.
Blue, 780b.
Blueback salmon, 5174b.
Bluebeard, 780d.
Bluebell, 781a, 3537d.
Bluebell of Scotland, 1086d.
Blueberry, 781b, 2858b.
Bluebird, 781b.
Blue blood, 6045b.
Bluebonnet, 5773a.
Blue Books, 781d.
*Blue Boy*, 4450.
Bluebuck, 278d.
Blue cardinal flower, 1183c.
Bluefield, W. Va., 782a.
Bluefields, Nicaragua, 782b.
Bluefish, 782b.
Blue flag, 3054d.
Blue gentian, 2420b.
Blue gold, 2523d.
Blue grass, 782c.
Blue grass region, 3224d.
Blue Grass State, 3223a.
Blue grosbeak, 2626d.
Blue gum, 2088a.
"Blue Hen's Chickens," 1743b.
Blue Hen State, 1743a.
Blue heron, 2784d.
Blue jay, American, 3127c.
Blue laws, 782c.
Blue litmus, 24c.
Blue Lodge, 3681a.
Blue Monday, 3885a.
Blue Mountains (Australia), 4183b.
Blue Mountains (Ontario), 4380b.
Blue Mountains (Washington), 6187c.
Blue Mountain tea, 2528b.
Blue palmetto, 4464c.
Blue print, 783a.
Blue racer, 761d.
Blue Ridge, 783b, 5946d.
Blue Room, 6274a.
Blue shark, 5337d.
"Blue sky" laws, 783b.
Blue spotted sunfish, 5629c.
Blue stone, 783d, 1573c.
Blue titmouse, 5821c.
Blue vitriol, 783d, 1573c.
Blue whale, 5078c.
"Bluff City," 215d.
Bluff Knolls, 6427c.
Bluing, 783d.
Blunderbuss, 784a.
Blushing, 784a.
B. N. powder, 5417c.
Boa, 784b.
Boabdil, 784d.
Boa constrictor, 784d.
Boadicea, 4118d.
Boanerges, 3109b, 3157a.
Boar, Wild, 785a.
Board measure, 1764d.
Board of directors, 5554d.
Board of education, State, 5239c.
Board of health, 785c.
Board of trade, 785d.
Board of trustees, 1515b.
Board Walk, 461b.
Boat, 787d.
Boatswain, 788a.
Boatswain (bird), 5885a.
Boaz, 5129b.
"Bobbies," 4549c.
Bobbin lace, 3290b.
Bobcat, 3545a, 6283c.
Bobolink, 788a, 5007a.
Bobwhite, 4519b, 4883b.
Bocages, 2296b.
Bocas del Toro, 4469b.
Boccaccio, Giovanni, 788d.
Bode, Johann, 5433b.
Bode's law, 5433c.
Body louse, 3524c, 5933a.
*Body of Civil Law*, 3193d.
Body ringworm, 5021d.
Boehmeria, 789a.
Boeotia, 318a, 789c.
Boeotian League, 790a, 5783a.
Boer, 790a.
Boer war, 5447c.
Bog-bumper, 754c.
Bogong, Mount, 6078b.
Bogota, Colombia, 790b.
Bog spavin, 5484c.
Bohemia, 790c.
Bohemian waxwing, 6227c.
Bohemund, 5696d.
Bohlen, Gustav von, 3280a.
Bohler, Peter, 6245d.
Boil, 791c.
Boiler, 791d.
Boiling, 6037c.
Boiling meat and fish, 1566d.
Boiling point, 793a, 5745a, 5787a.
Bois de Boulogne, 4494c.
Bois de Sioux River, 4954b.
Boise, Ida., 793b.
Bojanus, Organ of, 4438d.
Bok, Edward William, 793d.
Bokhara, 794b.
Bola, 5407c.
Bole of tree, 5870b.
Boleslaw the Brave, 4724a.
Boleyn, Anne, 794d, 2012c.
Bolivar, 1468a.
Bolivar, Simon, 795b.
Bolivar, Venezuela, 6048a.
Bolivia, 795b.
Boliviano, 1468a.
Boll weevil, 801c, 1607c.
Bologna, Italy, 802b.
Bologna, University of, 802c.
Bologna sausage, 5223c.
Bologna's *Statue of Mercury*, 3744c.
Bolsheviki, 6165b.
Bolsons, 4172c.
Bolton, England, 802d.
Bolton-le-Moors, England, 802d.
Bomb, 803a.
Bombardment, 803b, 5374b.
Bombay, India (city), 804b.
Bombay, India (province), 803d.
Bomoseen Lake, 6063d.
Bona fide, 805a.
Bonanza, 805a.
Bonanza Creek, 1714c.
Bonanza mines, 3563c.
Bonaparte family (except below), 805b.
Bonaparte, Napoleon, 1975b, 2336c, 3375c, 4062b, 6216d.
Bonaparte, Napoleon Francois Charles Joseph, 4963c.
Bonar, James, 806d, 1143d.
Bonar Law, Andrew, 3352b.
Bond, 807a.
Bond, Sir Robert, 808d.
Bonded warehouse, 808d, 809b.
Bone, 809b.
Boneblack, 810a, 1270a.
Boneset, 810d.
Bones of the head, 2738d.
Bone spavin, 5484c.
Bonet, Juan, 1719b.
Bone turquoise, 5919d.
Bonheur, Rosa, 810b.
*Bon Homme Richard*, 3171a.
Boniface (Popes), 810d.
Boniface, Saint, 811a, 3843b.
Bonifacio, Strait of, 5207c.
Bon Marché, 1772a.
Bonn, Germany, 811b.
Bonnet rouge, 3401c.
"Bonnie Doon," 522a.
"Bonnie Prince Charlie," 5593d.
Bonn University, 811c.
Bonspiel, 1673c.
Booby, 811c.
Bookbinding, 831b.
Book covers for kindergartens, 3248a.
Book exchange, 3402b.
Bookkeeping, 811d.
Bookkeeping for children, 827b.
Booklet on—
bee, 656c.
coal, 1447c.
cotton, 1608a.
elder, 1976d.
hawthorn, 2725a.
silk, 5383c.
sugar, 5616c.
tea, 5724a.
wheat, 6264a.
*Book of Common Prayer*, 1375a.

*Book of Marco Polo*, 4744c.
*Book of Mormon*, 3951a.
*Book of the Dead*, 3640c.
Bookplate, 828c.
Books and bookbinding, 829b.
Books of the Bible, 708b.
Bookworm, 834b.
Boomerang, 834c.
Boomer kangaroo, 3202c.
Boomer State, 4358b.
Boone, Daniel, 834d.
Boone, Ia., 835c.
Boötes, 835d.
Booth, Ballington, 837a.
Booth, Bramwell, 836d.
Booth, Edwin Thomas, 836a.
Booth, John Wilkes, 836b, 3445a.
Booth, Junius Brutus, 836a.
Booth, Maud Ballington Charlesworth, 837a.
Booth, William, 836c.
Booth-Tucker, Frederick Saint George de Latour, 837b.
Boots and shoes, 837c.
Boracic acid, 839b.
Borax, 839b.
Borchgrevinek, Carsten, 4728d.
Bordeaux, France, 839d.
Bordeaux mixture, 3002c.
Bordeaux wine, 1406d.
Borden, Sir Frederick William, 840a.
Borden, Sir Robert Laird, 840b.
Border states, 6146d.
Bordö Island, 2138c.
Bore, 841a, 5808d.
Boreas, 841b.
Bore of a shotgun, 5362b.
Borghese, Prince Camillo, 841c.
Borghese Palace, 841c.
Borgia family, 841d.
Borglum, Gutzon, 842a.
Borglum, Solon, 842c, 4810d.
Borgne Lake, 4751c.
Bori, 4043b.
Boric acid, 839b.
Boring machine, 842c.
Boring snail, 4439c.
Borneo, 842d.
Bornholm Island, 1756b.
Boron, 1294c.
Bortelhorn, Mount, 5151d.
Boru, Brian, 3050b.
Bosphorus, 844c.
Bosio, Joseph, 5276b.
Bosnia, 843d.
Bosniaks, 844a.
Bosnia-Seral, Bosnia, 844b.
Bosporus, 844c.
Boston, Mass., 456c, 845a.
Boston Ivy, 3090b.
Boston Massacre, 852a, 4985a.
Boston Port Bill, 852b.
Boston Tea Party, 852c, 4985b.
Boston terrier, 5763d.
Boston shilling, 4680d.
Boston University, 852d.
Boswell, James, 852d.
Botanical garden, 853a.
Botanical terms, 861a.
Botany, 853b.
Botargo, 3998a.
Botfly, 864b.
Botha, Louis, 864c, 2467a.
Bothnia, Gulf of, 864d.
Bothwell, James Hepburn, 865a, 3677d.
Böttger, Johann, 4762d.
Botticelli, Sandro, 865b.
Bottle, 865c.
Bottle gentian, 2420c.
Bottle gourd, 2545d.
Bottle-pool, 4754a.
Bottle-tree, 866a.
Boucicault, Dion, 866b.
Boughton, George Henry, 866c.
Bouillon, Godfrey de, 2519d.
Boulder, 867b, 5040d.
Boulder, Colo., 866d.
Boule, 2603d.
Boulton, Matthew, 6224c.
Boundary lines, 2430c.
Bounty, 867b.
*Bounty* mutiny, 4247b, 4684b.
Bouquetin, 2901a.
Bourassa, Henri, 867c, 1142a.
Bourbon, 867d.
Bourbon coffee, 1464c.
Bourbon-Orleans, House of, 4414b.
Bourbon whisky, 6268d.
"Bourgeois king," 2304d.
Bourgeois type, 5930d.
Bourget, Paul, 868b.
Bourinot, Sir John George, 868c, 1142c.
Bow and arrow, 868d.
Bowdoin, James, 869c.
Bowdoin College, 869c.
Bow drill, 3330c.
Bowell, Sir Mackenzie, 869d.
Bower-bird, 870b.
Bowery, The, 4207b.
Bowes, Edward J., 2920c.
Bowfin, 1830c.
Bowie, James, 134c.
Bowie knife, 369b.
Bowler (hat), 2712d.
Bow line knot, 3270c.
Bowling, 870c.
Bowling Green, Ky., 872b.
Bowls, 871c.
Bowmanville, Ont., 872c.
Bow River, 5217d.
Bowser, William John, 872d, 940c.
Box-elder, 1976c.
Boxer Rebellion, 873a, 1352a.
Boxing, 873b.
Boxing the compass, 1521c.
Box kite, 3264a.
Box tortoise, 875c.
Box tree, 875c.
Box turtle, 875c.
Boxwood, 875c.
Boxwood charcoal, 1270b.
Boycott, 875d.
Boycott, Charles, 875d.
Boyden, Seth, 4140a.
Boy kite, 3264d.
Boyle, Robert, 1294a.
Boyle's law, 876a, 2890c.
Boyne, Battle of the, 876a.
Boys' and girls' clubs, 876b.
Boys' corn clubs, 1588c.
Boy Scouts, 884a; code in signaling, 5378c.
Bozeman, Mont., 885c.
Bozzaris, Marco, 885d.
B. P. O. E., 2014d.
Brabant, Low Countries, 885d.
Bracebridge, Ont., 886b.
Brachial arteries, 391a, facing 1388.
Bracken, 892d.
Bracket mushroom, 4014d.
Bract, 886b.
Braddock, Edward, 886c, 6202a.
Braddock, Pa., 886d.
Braddock's expedition, 2230b.
Bradford, England, 887a.
Bradford, Pa., 887b.
Bradford, William, 887c, 3705b, 4714b.
Bradstreet, Anne, 888a.
Bradstreet Commercial Agency, 1512d.
Brady, Cyrus Townsend, 888b.
Braganza diamond, 5836d.
Bragg, Braxton, 888c.
Brahe, Tycho, 888d.
Brahma, 889a.
Brahmanas, 6042a.
Brahmanism, 889b.
Brahmany bulls, 6409b.
Brahmaputra River, 890a, 5806b.
Brahms, Johannes, 890b.
Brahnis, 565c.
Braid, James, 2897d.
Braila, Rumania, 5104d.
Braille, 772a.
Brain, 890d.
Brainerd, Minn., 892d.
Brake, 892d.
Brake horse power, 2843b.
Brakspere, Nicholas, 59d.
Bramante, Donato, 893b.
Bramble, 893c.
Brampton, Ont., 893c.
Bran, 893d.
Branch and line badges (military), 5940a.
Brandeis, Louis Dembitz, 893d, 6308c.
Brandenburg, 894b, 4854d.
Brandenburg Gate, facing 2473.
Brandes, Georg Morris Cohen, 894d.
Branding, 5710d.
Brandon, Man., 895a.
Brandy, 895c.
Brandywine, Battle of the, 895d.
Brangwyn, Frank, 895d.
Branly, Edward, 6325b.
Brant, Joseph, 896a.
Brantford, Ont., 896c.
Brant goose, 897a.
Bras d'Or Lake, 897b.
Brasie, 2531d.
Brass, 897c.
"Bravest of the Brave," 4222c.
Braz, Wenceslao, 907a.
Brazil, Ind., 907d.
Brazil, the United States of, 898a.
Brazilian Current, 4334b.
Brazilian Highlands, 899d.
Brazilian national hymn, 2893d.
Brazilian ruby, 5836d.
Brazilian sapphire, 5849a.
Brazil nut, 908a.
Brazos River, 908b, 5769c.
Brazos River, Cañon of, 4175c.
Brazos River Canal, 1147a.
Breach of the peace, 4535a.
Breach wool, 6354b.
Bread, 908c, 2818a.
Bread and Butter State, 3827a.
Bread and milk, 3804a.
Breadfruit, 911b.
Breadstuffs, 2553d.
Breadth of states, 5973c.
Breaker boys, 1448a.
Breakfast foods, 912a.
Breaking, 2206a.
Breaking-in system, 6321b.
Breaking the will, 6288d.
Breakwater, 912b.
Breastplate of high priest, 2794d.
Breast stroke, 5656d.
Breath and breathing, 912c, 3412c.
Breathing letter, 2651c.
Breathing pores, 3362a.
Breckinridge, John Cabell, 913d.
Breda, Treaty of, 4300d.
Breech (cannon), 406a.
Breech-loading guns, 5017b.
Breech-loading shotgun, 5362b.
Breeding, 914a.
Breeding poultry, 4801d.
Breed's Hill, 998d.
Breitenfeld, Battle of, 3375c, 5792a, 5813d.
Bremen, Germany, 914d, 2687a.
Bremerhaven, Germany, 915b.
Brennus the Gaul, 5787d.
Brent goose, 897a.
Breslau, Germany, 915c.
*Breslau, The*, 6167c.
Brest, France, 915d.
Bretagne, France, 947a.
Bret Harte, 2706b.
Breton, Jules Adolph, 916a.
Brevet, 916b.
Breviary, 916b.
Brevier type, 5930d.
Brewer, Mount, 1057b.
Brewing, 916c; chemistry of, 917b.
Brewster, Sir David, 2229d, 3200a, 5549b.
Brewster, Hon. H. C., 940d.
Brewster, William, 917c.
Brian Boru, 3050b.
Briand, Aristides, 917d.

Briar root, 663a.
Bribery, 918a.
Brick and brick-laying, 918a, 919b.
Bricklayer's itch, 3087a.
Brick paving, 5029d.
Bridal Veil Falls, 6397b.
Bridal wreath, 919d, 5500d.
Bridge, 919d.
Bridge (game), 923c.
Bridge of Sighs, 925b, 6051d.
Bridgeport, Conn., 925d.
Bridges, Robert, 926c.
Bridget, Saint, 927a.
Bridge toll, 5830c.
Bridgeton, N. J., 927a.
Bridgewater, N. S., 927c.
Bridgman, Laura Dewey, 927c.
Brier pipe, 4681c.
Brigade, 380a, 927d.
Brigadier-general, 927d, 4929a.
Brigade major, 3609c.
Brigand, 571c.
Briggs, Clare, 928a, 1185c.
Brighamites, 3343a.
Bright, John, 928a.
Bright, Timothy, 5360d.
Bright Angel Trail, 2560a.
Bright-line spectrum, 5488d.
Brighton, England, 928d.
Bright's disease, 928d.
Brimstone, 929b, 5620b.
Brindled gnu, 2517c.
*Bringing Home the Calf*, 4450.
Brisbane, Arthur, 929c.
Brisbane, Australia, 929b.
Brisket, 658d.
Bristles, 929d.
Bristol, England, 929d.
Bristol, Conn., 930b.
Bristol, Pa., 930c.
Bristol, R. I., 930d.
Bristol, Tenn. and Va., 931b.
Bristow, Benjamin H., 6269b.
Britannia Major, 2582d.
Britannia Minor, 2583a.
Britannicus, 4118c.
*British Almanac*, 209a.
British America, 931d.
British army, 382c.
British Cabinet, 1035a.
British Columbia, 932a.
British Columbia, University of, 942c.
British courts, 1615c.
British Empire, 2585b.
British Empire flags, 2196b.
British Grenadier Guards, 2622b.
British Guiana, 943a.
British Honduras, 944a.
British imperial quart, 4886b.
British Isles, 944c.
British merchant marine, 3740b.
British Museum, 944d.
British national hymn, 2894a.
British New Guinea, 4154a.
British North America Act, 946b, 1124c, 4898b.
British royal crown, 1649d.
British Somaliland, 5438d.
British South Africa Company 5001b.
British sovereign, 2523c.
British West Indies, 946c.
Brittany, 947a.
Brittle silver, 5386b.
Broad Church party, 1375b
Broadcloth, 947b.
Broadleaf maple, 3643a.
Broad stair (Montessori Method), 3920a.
Broadsword, 947c.
Broadway, N. Y., 4206b.
Broadwood, John, 4660b.
Brocade, 947c.
Broche, 5699b.
Brock, Sir Isaac, 947d, 4900b.
Brock, Thomas, 5277a.
Brocken, The, 2711d.
Brockton, Mass., 948b.
Brockville, Ont., 948c.
Brodeur, Louis Philippe, 948d.
Brodribb, John Henry, 3066d
Brogue, 838a.
Broiling, 1566d.
Broken bones, 809d.
*Broken Pitcher*, 4450.
Broker, 949a.
Brokerage, 949a.
Bromides, 949b.
Bromine, 949b.
Bronchial tubes, 3536d.
Bronchitis, 949c, 3537c.
Broncho beans, 3185d.
Bronchus, 3537a.
Bronte, Charlotte, 949d.
Bronze, 950b.
Bronze Age, 950c.
Bronze grackle, 1649b.
Bronx, The, 4205b.
Bronx Park, N. Y., 4211a.
Brooch, 950d.
Brook Farm, 951a.
Brookline, Mass., 951b.
Brooklyn, N. Y., 951c.
Brooklyn Bridge, 952a.
Brook mint, 3838b.
Brooks, Phillips, 952b.
Brooks, Preston S., 4667c.
Brook trout, 5885d.
Broom, 952d.
Broom corn, 952d.
Broom-corn millet, 3807d.
Broom grass, 952d
Broom-making, 953b.
Broom moss, 3969a.
"Brother Jonathan," 953c, 1548d, 5890a.
Broughton, Jack, 4830b.
Brown, 953d.
Brown, Charles Brockden, 228d.
Brown, Elmer Ellsworth, 953d.
Brown, George, 954a.
Brown, Henry Kirke, 954c, 5277b.
Brown, John, 954d.
Brown, Joseph Emerson, 5986d.
Brown bear, 637b.
Brown brandy, 895c.
Brown crane, 1623c.
Browne, Charles Farrar, 955c.
Brown-headed nuthatch, 4314d.
Brownie, 955d.
Browning, Elizabeth Barrett, 955d.
Browning, Robert, 956c.
Brown parrot, 4513d.
Brown peat, 4545c.
Brown pelican, 4554a.
Brown rat, 4932b.
Brown rot, 4539a.
Brown sugar, 5615b.
Brownsville, Tex., 957c.
Brown-tail moth, 958a.
Brown thrasher, 958c.
*Brown Thrush, The*, 3322a.
Brown University, 958d.
Bruce, Robert, 959b, 5498c.
Bruchesi, Louis Paul Napoleon, 959d.
*Bruges, Belfry of*, 669b.
Bruges, Belgium, 959d.
Brule River, 6331d.
Brumidi, Constantino, 6195b.
Brummell, George Bryan, "Beau," 960a.
Brunelleschi, Filippo, 960b, 4687a.
Brunhilde, 4226c, 5379d.
Brünn, 960c.
Brunswick (German duchy), 961a.
Brunswick, Family of, 961b.
Brunswick, Ga., 961c.
Brunswick, Germany, 960d.
Brunswick-Wolfenbüttel Family, 961c.
Brush, Charles Francis, 962a.
Brush-footed butterflies, 1026b.
Brush turkey, 3976c.
Brussels, Belgium, 962a.
Brussels rose lace, 3290a.
Brussels rug, 1199d.
Brussels sprouts, 963a.
Brutus, Marcus Junius, 963b.
Bryan, William Jennings, 315c, 963c, 6303c.
Bryant, William Cullen, 965b.
Bryce, George, 966c.
Bryce, James, 966d.
Brymner, Douglas, 967c.
Brymner, William, 967b.
Bryn Mawr College, 967c.
Bryophytes, 862a, 967d.
Buccaneer, 968a.
Bucentaur, 6052c.
Buchanan, James, 968a.
Bucharest, Rumania, 973b.
Bucharest, Treaty of, 555a.
Buck, 1739b.
Buck, Dudley, 973c.
Bucketshop, 973d.
Buckeye, 974a.
Buckeye butterfly, facing 1022.
Buckeye State, 974a, 4346a.
Buckingham, George Villiers, Duke of, 974a.
Buckingham, Que., 974a.
Buckle, Henry Thomas, 974c.
Buckler, 5351d.
Buckskin, 974c, 1740a
Buckthorn, 974d.
Buckwheat, 975a.
*Bucolics*, 6061c.
Bud, 975d.
Buda, Hungary, 976c.
Budapest, Hungary, 976c.
Buddha, 978a.
Buddhism, 977b.
Budding, 2550a.
Budget, 978d.
Bud grafting, 2550a.
Buea, Kamerun, 3201a.
Buena Vista, Battle of, 979b.
Bueno, Saint, 6311c.
Buenos Aires, Argentina, 337a, 979c.
Buffalo, 981b.
Buffalo, N. Y., 982a.
"Buffalo Bill," 1461a.
Buffalo bug, 1198a.
Buffalo Indians, 5361b.
Buffalo moth, 1198a.
Buffalo Park, 4506a.
Bug, 985a.
Bugle and bugle calls, 985a.
Bug River, 5114b.
Building, 985b.
Building and loan associations, 987c.
Building paper, 1195d.
Building societies, 987c.
Building stone, 988a.
Building stones of the body, 4317c.
Building trades, 985b.
Bukharest, Rumania, 973b.
Bukowina, 989a.
Bulama, Africa, 4785c, 4786a.
Bulb, 989a.
Bulfinch, Charles, 848a.
Bulgaria, 989b.
Bulgarian atrocities, 991c.
Bull, 992d.
"Bull, John," 993a.
Bull, The (mythology), 5711c.
Bulla aurea, 2526d.
Bullae, 5279c.
"Bull City," 1886b.
Bulldog, 993b.
Bullet, 993c.
*Bulletin of the Pan-American Union*, 4476c.
Bullfighting, 993d, 5475b.
Bullfinch, 994b.
Bullfrog, 994b.
Bullhead, 1226c.
Bullion, 994d, 1467b.
Bullion State, 3855a.
"Bull Moose" party, 3943d.
Bulloch, Martha, 5069b.
Bull pine, 4677d.
Bull Run, Battles of, 995a.
Bull terrier, 5763d.
Bülow, Bernhard Heinrich, Prince von, 995d.
Bülow, Hans Guido von, 996b.

Bulrush, 996c, 1232b.
Bulwer, Sir Henry, 1413c.
Bulwer, John, 1719b.
Bulwer-Lytton, Edward George Earle, 996d.
Bulwer-Lytton, Edward Robert, 997b.
Bulyea, George Hedley Vicars, 997b.
Bumblebee, 653a, 1439d.
Bunchberry (color plate), facing 2224.
Bundesrat, 997c, 2473c.
Bungalow, 997c.
Bunion, 998a.
Bunker (fish), 3733a.
Bunker Hill, Battle of, 998a.
Bunker Hill Monument, 998d.
Bunkers, 2530c.
Bunny, 4907b.
Bunsen, Robert Wilhelm Eberard, 998d.
Bunsen battery, 999a.
Bunsen burner, 999a.
Bunting, 999b.
Bunyan, John, 999b.
Buoy, 1000a.
Buoyancy of air, 118a.
Burbank, Luther, 298b, 1000c.
Burbank white blackberry, 757a; spineless cactus, 1039a; plum, 4710b.
Burdette, Robert Jones, 1002a.
Burdock, 1002a.
Bureau, 1002c.
Bureaucracy, 1002c.
Bureau of—
American Ethnology, 2084d.
American Republics, International, 4475c.
Census, 1512c, 3013d.
Charities, 1272a.
Child Welfare, 3013d.
Corporations, 1512c.
Education, United States, 1953b, 3013c.
Fisheries, 1512c.
Foreign and Domestic Commerce, 1512c.
Labor Statistics, 3283d.
Lighthouses, 1512c.
Manufactures, 1512c.
Navigation, 1512c.
Pensions, 4575d.
Printing and Engraving, 5867d.
Standards, 1512c.
Burgermeister, 1003a.
Burgesses, House of, 1002c, 6096c.
Burglar-proof safe, 5138c.
Burglary, 1003a.
Bur grass, 5187b.
Burgomaster, 1003a.
Burgoyne, John, 1003c.
Burgundy, 1003d.
Burial, 1004a.
*Burial of Sir John Moore*, 3942b.
"Buried sunshine," 1442d.
Burke, Edmund, 1004c.
*Burke's Peerage*, 1005a.
Burlap, 1005b.
Burlesque, 1005b, 1509a.
Burlingame, Anson, 1005c.
Burlington, Ia., 1006a.
Burlington, Ont., 1005d.
Burlington, Vt., 1006c.
Burma, 1006d.
Burma rice mill, facing 5007.
Burne-Jones, Sir Edward, 1008d
Burnett, Frances Eliza Hodgson, 1009a.
Burney, Frances, 4303c.
Burnham, Clara Louise, 232b.
Burnham, Daniel Hudson, 1009c, 6194b.
Burnham, Sherburne Wesley, 1010a.
Burning mirror, 5432d.
Burnishing sand, 1354d.
Bur oak, 4323a.
Burns, John, 1010b.
Burns, Robert, 521b, 1010c.
Burns and scalds, 1012b.
Burns' cottage, 1011c.
Burnside, Ambrose Everett 1012c.
"Burnsides," 1012d.
Burns' Memorial, 521c.
Burnt alum, 217c.
Burnt offering, 5138a.
Burnt umber, 5937b.
Burr, Aaron, 1012d.
Burr, Theodosia, 1013c.
Burrard Inlet, 6031d.
Burrell, Martin, 1013d.
Burrinjuck dam, 488d.
Burro, 2841c.
Burroughs, John, 1013d.
Burrowing owl, 4435a.
Burton, Sir Richard, 5490a.
Burwash, Nathanael, 1014b.
Burying beetle, 1014c.
Bushbuck, 278b.
Bushel, 1014d.
Bushmen, 1014d.
Bushnell, David, 5603c, 5842d.
Bush tits, 5821c.
Business, Order of, 4509d.
Business college, 1015b.
Business letters, 3289b.
Business management of a newspaper, 4185c.
Business meeting, Conducting a, 4509d.
Bust, 1016a.
"Buster Brown," 4431c.
Butcher bird, 5364d.
Butkadah, 4446a.
Butler, Benjamin Franklin, 1016b.
Butler, Nicholas Murray, 1016d.
Butler, Pa., 1017b.
Butler, Samuel, 1017a.
Butler, William Orlando, 233c.
Butte, 1017c, 3904b.
Butte, Mont., 1017c.
Butter, 1018b.
Butter, Nathaniel, 4186c.
Butter and eggs, 5823b.
Butter and its substitutes, 62c.
Buttercup, 1021a.
Buttercup family, 854a, 857c.
Butterfly, 1021b, 1372b, 2999c, 3752b, 3970b.
Butterfly and moth compared, 3970c.
Butterfly kite, 3264c.
Butterine, 4369a.
Buttermilk, 1027b.
Butternut, 1027b.
Butterwort, 1027d.
Butterworth, Hezekiah, 1028a.
Button, 1028b.
Buttonball, 4696c.
Buttonhole stitch, 5326d.
Buttonwood, 5667a.
Buying for the table, 2817b.
*Buzz* (game), 2378c.
Buzzard, 1029c.
By, John, 4428d.
Bybloemens, 5899a.
*Bye, baby bunting*, 3316b.
Byeluka Mountain, 215a.
By-law, 1029d.
Bylot, Robert, 4279b.
Byng, Major-General, 6164b.
By-products of cotton, 1607a.
By-products of meat packing, 3712c.
Byron, George Noel Gordon, 1029d.
Bytown, Ont., 4428d.
Byzantine architecture, 325b.
Byzantine art, 1032c.
Byzantine Empire, 1031a.
Byzantine rite, 3466d.
Byzantium, 1032d, 1556a.

# C

C, 1033a.
Caaba, 3197b.
Caazapa, Paraguay, 4486b.
Cabal, 1033a.
Caballah, 4331b.
Cabbage, 1033d.
Cabbage butterfly, facing 1022, 1034a.
Cabbage enemies, 1033a.
Cabbage lettuce, 3390d.
Cabbage palm, 1034b.
Cabbage palmetto, 4462d.
Cabbage worm, 1034b.
Cabildo, The, 3517d.
Cabinet, 1034c.
Cabinet, British, 2587c.
Cabinet officers in Canada, 3823d.
Cabinet officers in England, 3823c.
Cabin John Bridge, 318d.
Cable, George Washington, 1035c.
Cable, Submarine, 1036a.
Cabochon, 2413b.
Cabot, George, 2706b.
Cabot, John, 1038b.
Cabot, Sebastian, 1038b.
Cabot Strait, 5156a.
Cabral, Pedro Alvarez, 1038c.
Cabul, Afghanistan, 3197b.
Cacao, 1038d.
Cache Valley, 6012a.
Cacique, 4634a.
Cactus, 1038d.
Cactus wren, 6361c.
Cad, 1040a.
Cadet, 1039d.
Caddie, 1040a.
Caddoan Indians, 4532a.
Caddo Lake, 5769d.
Cadet system of military training, 1130d.
Cadillac, Antoine de la Mothe, 1040a.
Cadillac, Mich., 1040b.
Cadiz, Spain, 1040c.
Cadmium, 1294c.
Cadmus, 1041a.
Caduceus, 3744b.
Caecum, 201b, 294a.
Caedmon, 1041b.
Caelian Hill, 5064a.
Caen, France, 1041c.
Caesar, 1041c, 3198b, 5821a.
Caesar, Caius Julius, 1041d, 2407d, 4750b, 5099d.
Caesarea Augusta, 5205c.
Caesarion, 1417b.
Caesar's Head, 5456d.
Caesium, 1294c.
Caffeine, 202d, 1043d, 1462b, 2741c.
Cage birds, 733b.
Cagliari, Sardinia, 1044a.
Caglistro, 166a.
Caguas, Porto Rico, 4773b.
Cahokia Mound, 3976d.
Cain, 1044b.
Caine, [Thomas Henry] Hall, 1044b.
Cairngorm, Mount, 2557c.
Cairntoul, Mount, 2557c.
Cairo, Egypt, 1044d, 3720b.
Cairo, Ill., 1046a.
Caisson, 1046c.
Calabash, pipe and tree, 1047b.
Caladium, 1475a.
Calah, Assyria, 432d.
Calais, France, 1047d.
Calamine, 6411d.
Calcareous tufa, 5898a.
Calcimine, 1048b.
Calcination, 3060a.
Calcine plaster, 4701b.
Calcite, 1048c, 2688b.
Calcium, 1048c.
Calcium carbide, 23a, 1048d, 1177b.
Calculating machines, 1049a.
Calculus, 1049c.
Calcutta, India, 1049c.
Calder, James Alexander, 1050c.
Caledonia, 1050d, 5256b.
Caledonian Canal, 1149a, 5260d.
Calendar, 1051a.
Calendar for—
April, 302a.

Calendar for—*Continued*
August, 473a.
December, 1728a.
February, 2146a.
January, 3112a.
July, 3183a.
June, 3186a.
March, 3646a.
May, 3702a.
November, 4306a.
October, 4338a.
September, 5307a.
Calendar month, 3931c.
Calendar stone, 532a.
Calendar year, 6385c.
Calends, 3931c.
Calgary, Alta., 1053d.
Calhoun, John Caldwell, 1054d.
Caliari, 6070c.
Calico and calico printing, 1055c.
Calico printing, 1055c.
California, 1056b.
California, Gulf of, 1070a.
California, Lower, 1070b.
California, University of, 1070d.
California current, 4334c.
California pelican, 4553d.
California poppy (color plate), facing 2224, 4760c.
California sardine, 5207b.
California sea lion, 5283a.
California tent caterpillar, 5759c.
California toad, 2837c.
California vulture, 6118d.
California woodpecker, 6352c.
Caligula, Caius Caesar Augustus Germanicus, 1071c.
Calisthenics, 1071d.
Calixtines, 2881b.
Calixtus (Popes), 1071d.
Calla, 1072a.
Callao, Peru, 1072b.
Calling hare, 4671d.
Calliope, 1072c, 4012b.
Callisto, 638a.
Call loans, 578a.
*Call of the Wild*, 1827b, 3492d.
Calms, Regions of, 1072c.
Calms of Cancer, 1072d, 6309b.
Calms of Capricorn, 1072d, 6310b.
Calomel, 1073a, 3742d.
Caloosahatchee River, 2213d.
Calorie, 1073b, 4316c.
Calorimetry, 1073b.
Calory, 1073b.
Calosoma beetle, 662c.
Calpe, 2781b.
Calumet, 1073d.
Calumet, Mich., 1073d.
Calvary cross, 1646b.
Calve, Emma, 1074a.
Calvert, Cecilius, 562c, 3676c.
Calvert, Sir George, 562c, 3676c.
Calvin, John, 1074b, 4810a, 4959c.
Calvinism, 1075a, 4807a.
Calvo Doctrine, 4475d.
Calycanthus, 1075a.
Calypso, 1075b.
Calyx, 2223c.
Cam, 1075b.
Camagucy, Cuba, 1075c.
Camarano, 5886c.
Cambium layer, 2549d.
Cambodia, 1075d.
Cambodia River, 3724a.
Camboge, 2372c.
Cambrian Period, 1076b, 2439c.
Cambrian Society, 590d.
Cambridge, Mass., 1076c.
Cambridge, O., 1077a.
Cambridge, University of, 1077b.
Cambridgeport, Mass., 1076d.
Cambric, 1077d.
Cambyses II, 1077d, 4595a.
Camden, Battle of, 4989b.
Camden, N. J., 1078a.
Camel, 1078d.
Camel bird, 4423a.
Camellia, 1079c.
Camelopard, 2497a.
Camelot, 2813b.
Camembert cheese, 1291c.
Cameo, 1079d, 1524c, 2413c.
Camera, 1080a.
Camera, Moving picture, 3989d.
Camera lucida, 1081b.
Camera obscura, 1081c.
Cameron, Agnes Dean, 1081d, 1143d.
Cameron, George Frederick, 1082a, 1143c.
Cameroon, 3200d.
*Camille*, 1079d, 1082a.
Camino Real, 4470b.
Camorra, 1082c.
Camisole, 5326b.
Camlet, 259a.
Camoēs, Luiz vaz de, 4781a.
Camomile, 1265a.
Camorristas, 1082c.
Camouflage, 5603b, 6170d.
Camp, 1082b.
Camp, Walter, 1086a.
Campagna di Roma, 3342c, 5064a.
Campanile, 1086b.
Campanini, Cleofonte, 1090b.
Campanula, 1086d.
Campbell, Alexander, 1087a, 1802a.
Campbell, Sir Alexander, 1087c.
Campbell, Sir Colin, 2716a.
Campbell, Thomas, 1087d, 1802a.
Campbell, William Wilfred, 1088a, 1143c.
Campbellford, Ont., 1088a.
Campbellton, N. B., 1088b.
Camp Borden, Ont., 1133a.
Campeachy, Gulf of, 1088c.
Campeachy, Mexico, 1088c.
Campeche, Mexico, 1088c.
Campers' tent, 5758d.
Camp Fire Girls, 1088c.
Camp fires, 1084b.
Camphor, 1089d.
Camp Hughes, Man., 1132d.
Campine, 666d.
Campo Formio, Treaty of, 3083b, 4063d.
Campus Martius, 1090c, 1778b.
Camp Valcartier, Que., 1132c.
Camp Wikoff, L. I., 2544d.
Camrose, Alta., 1090c.
Canaan, 3393d, 4458b.
Canaanites, 1091a.
*Canada, a National Hymn*, 344c.
Canada, Dominion of, 1091a.
Canada, History of, 1119b.
Canada, People of, 1092b.
Canada balsam, 561c, 1137d.
Canada East, 4887a.
Canada goose, 1137d, 2535c.
Canada hemp, 1829d.
Canada in the War of the Nations, 1129a.
Canada rice, 5008a.
Canada snakeroot, 5420b.
Canada Temperance Act, 4835a.
Canada thistle, 1138c.
Canada thistle seed, 6238d.
Canada West, 4378b.
Canadian agriculture, 1104a.
Canadian animal life, 1100b, 1101.
Canadian army, 382b.
Canadian Art Club, 4455d.
Canadian Cabinet, 1035c.
Canadian Cabinet officers, 2823d.
Canadian canals, 1110a.
Canadian census, 1251a.
Canadian citizenship, 1391c.
Canadian coal areas, 1444b.
Canadian coins, Rare, 4312a.
Canadian colleges, 1473d.
Canadian Confederation, 1124a.
Canadian copyrights, 1575c.
Canadian courts, 1118b, 1615b
Canadian dairying, 1689d.
Canadian debt, 4076c.
Canadian divorces, 1822c.
Canadian dry farming, 1868c.
Canadian education, 1113a.
Canadian educational museums, 1952d.
Canadian fisheries, 1107a.
Canadian forest areas, 1103b.
Canadian frosts, early and late, 1098-1099.
Canadian geological survey, 2432d.
Canadian government, 1114a.
Canadian history, 1119b.
Canadian homestead laws, 2824b.
Canadian illiteracy, 2932a.
Canadian immigration, 2024c.
Canadian jay, 3127c.
Canadian legal tender, 3371a.
Canadian libraries, 3403c.
Canadian lynx, 6283b.
Canadian mortality tables, 3958a.
Canadian life-saving service, 3420c.
Canadian literature, 1139a.
Canadian military affairs, 1130a.
Canadian military camps, 1132c.
Canadian mining operations, 3821b.
Canadian mint, 1128c.
Canadian money orders, 3888d.
Canadian national hymn, 2893d.
Canadian natural gas, 4078d.
Canadian naturalization, 4079d.
Canadian Northern Railway, 1112a, 3566a.
Canadian otter, 4430a.
Canadian overseas expeditionary force, 1130d.
Canadian Pacific Railway, 933c, 1112a, 3556a, 4920d.
Canadian parcel post, 4491c.
Canadian pardons, 4492c.
Canadian parks, 4506a.
Canadian Parliament, 1116b.
Canadian penny banks, 5226b.
Canadian plant life, 1100b.
Canadian Premier, 1115d.
Canadian provinces, Government of, 1119a.
Canadian public lands, 3309d.
Canadian quarries, 4886a.
Canadian railroads, 1111c.
Canadian rainfall, 1105.
Canadian Red Cross Society, 4952a.
Canadian regulation of railroads, 4916a.
Canadian River, 1144d.
Canadian Rockies, 1095a, 5045a.
Canadian Socialist League, 5426b.
Canadian tax system, 5713d.
Canadian telephone service, 5742d.
Canadian Thanksgiving day, 5781a.
Canadian townships, 3310c.
Canadian universities, 6001d.
Canadian water power, 6219d.
Canadian weather bureau, 6232a.
Canadian women's clubs, 6349d.
Canandaigua, Lake, 4196c.
Canal, 1144b.
Canals of Canada, 1110b.
Canals of China, 1343b.
Canals of Mars, 3662c.
Canals of Venice, 2535b.
Canal Zone, Panama, 2539a, 3968b, 4472c.
Canaria, 1149d.
Canary, 1149b.
Canary Current, 4334b.
Canary glass, 2230a.
Canary Islands, 1149d.
Canberra, Australia, 490c.
Can buoy, 1000c.
Cancellation, 1150b.
Cancer, 1151c.
Cancer (the crab), 1152c.
Cancer, Tropic of, 230b.
Candelita, 4955d.
Candies, Adulteration of, 63b.
Candleberry, 1152d.
Candlefish, 1153a.
Candlemas day, 2145c.
Candle sperm, 4651b.
Candling eggs, 1962c.
Candy and candy making, 1153a.

Candytuft, 1154b.
Cane, 1154c.
Cane flume, facing 5616.
Cane sugar, 5614d.
Canine teeth, 5728c.
Canis Major, 1154d.
Canker sore, 1155a.
Cankerworm, 1155a.
Canmore, Malcolm, 5261d.
Canna, 1155b.
Cannae, Battle of, 2684d.
Cannel coal, 1443c.
Cannibal, 1155c.
Canning and preserving, 2247b.
Canning clubs, 1156a.
Cannon, 1157d.
Cannon, Joseph Gurney, 1158a.
Canoe and canoeing, 1158d.
Cañon, 1164d.
Canon, The, 705d.
Canon law, 1160b.
Canonization, 1160c.
Canora, Sask., 1160c.
Canossa, 2621c, 2773b.
Canova, Antonio, 1160d.
Canso, Strait of, 4296d, 5156a.
Cantabrian Mountains, 5473a.
Cantaloupe, 4034c.
Cantalupo, Italy, 4034c.
Cantata, 1161a.
Canteen, 1161b.
Canterbury, England, 1161c.
Canterbury Cathedral, 1161d, 2036d.
*Canterbury Tales*, 1162a.
Canticles, 5437a.
Cantilever bridge, 922c.
Canton (political), 1162b.
Canton, China, 1162c.
Canton, Ill., 1163b.
Canton, O., 1163d.
Cantonments of the United States, 6178a.
Canute, 1164a.
Canvas, 1164b.
Canvasback duck, 1164c, 1873b.
Canyon, 1164d.
Canyon de Chelly, 362c.
Canyons of rivers, 5025c.
Caoutchouc, 5098c.
Caparro, Porto Rico, 4776c.
Cape Adare, 4728d.
Cape Breton Island, 1165a.
Cape buffalo, 981c.
Cape Cod Canal, 1165d, 3686b.
Cape Diamond, 4894b.
Cape Girardeau, 1166c.
Cape Horn Rock, 4403d.
Cape Indians, 3609d.
Cape jasmine, 2383c.
Capella (constellation), 3805c.
Capella (star), 443d.
Cape May, N. J., 4163b.
Cap May warbler, 6137c.
Cape North, 4282d.
Cape of Good Hope, Province of the, 1167a.
Caper, 1169a.
Cape rubies, 5101a.
Cape Saint Vincent, 4779c.
Capet, Hugh, 2301d.
Capetian dynasty, 1169c, 1275d.
Cape-to-Cairo Railway, 1169d.
Cape Town, South Africa, 1171b.
Cape Verde Islands, 1171c, 4782b.
Capillaries, 1171d, 1388a.
Capillarity, 1172a.
Capital (architecture), 1507a.
Capital (economics), 1172b.
Capitalization, 5303c.
Capital punishment, 1173b.
Capitals of the United States, 1173d.
Capitation tax, 4743c.
Capitol, 1174b.
Capitol, Wash., D. C., 6194d.
Capitoline Hill, 5064a.
Cappadocia, 4653a.
Capri, Island of, 1174c.
Capricorn, Tropic of, 330b.
Capricornus, 1174c.
Capsicum, 1174d.
Capstan, 6265b.
Captain, 1175a, 4929a.
*Captain Bonneville*, 6371b.
Captain Kidd, 3236d.
Cap Tourmente, 4888b, 5157a.
Capuchin monkey, 3891d, 5204b.
Capuchins, 1175b.
Carabao, 1175b.
Caracalla, Baths of, 625b.
Caracas, Venezuela, 1175c.
Caracci, 1200a.
Carapace, 5920a.
Carat, 1176a, 1785b, 2523b.
Caravaggio, Michelangelo Merisi da, 1176b.
Caravan, 313b, 1176c.
Caravel, 1176d, 1502a.
Caraway, 1177b.
Carbajal, Francisco, 6306a.
Carbides, 1177b.
Carbohydrates, 1177c, 2243a, 3413a.
Carbolic acid, 281d, 1177d.
Carbon, 1178a.
Carbonado, 1785c.
Carbonate of lead, 3355d.
Carbonates, 1178b.
Carbon bisulphide, 1178d.
Carbondale, Pa., 1178c.
Carbon dioxide, 913b, 1179a, 1447b.
Carbonic-acid gas, 281d, 913b, 1179a.
Carbonic oxide, Antidote for, 281d.
Carboniferous Period, 1179c, 2440b.
Carboniferous System, 1179d.
Carbon lamp, 1990a.
Carbon monoxide, 1180c.
Carbon oxide, 1447b.
Carborundum, 1180c.
Carbuncle (garnet), 209b, 1180d.
Carbuncle (infection), 791d.
Carburation, 1181b.
Carburetor, 1181a.
Cardamon, 1182a.
Cardan, Jerome, 1718d.
Cardiac orifice, 7c.
Cardiff, Wales, 1182a.
Cardinal, 1182b.
Cardinal bird, 1182d.
Cardinal flower, 1183c.
Cardinal points, 1520d.
Carding wool, 6354c.
Cards, Playing, 1183c.
Cardston, Alta., 1184a.
Care of poultry, 4801a.
Care of the hair, 2660a.
Carew, James, 5765c.
Carey, Henry, 226a, 2520c.
Carey, William, 3843d.
Caria, 4653a.
Caribbean Sea, 1184a.
Cariboo Trail, 942a.
Caribou, 1184c.
Caricature, 1185a.
Caries, 1769a.
Carillon Canal, 5014b.
Carleton, Sir Guy, 1185c.
Carleton, Mount, 4142d.
Carleton, Will, 1185d, 4533c.
Carleton Place, Ont., 1186a.
Carlisle, Pa., 1186a.
"Carlisle Indians," 5999b.
Carlisle Indian School, 1186c, 5999a.
Carlos I, 4784c.
Carlsbad, Bohemia, 1186c.
Carlyle, Thomas, 1186c.
Carman, Albert, 1187c.
Carman, [William] Bliss, 1187d.
Carmelites, 3732d.
*Carmen*, 1188a, 3747b.
*Carmencita*, 4450.
Carmine, 1188b.
Carnation, 1188b, 4681b.
*Carnation Lily*, 4450.
Carnegie, Andrew, 1188d.
Carnegie, Pa., 1190c.
Carnegie endowment for international peace, 1189c.
Carnegie Foundation for the Advancement of Teaching, 1189d.
Carnegie hero fund, 1190a.
Carnegie Institution, 1190a.
Carnegie libraries, 1190c, 3403d.
Carnelian, 1190d.
Carnivorous animals, 1191a.
Carnivorous plants, 858a, 1191c.
Carnot, Marie Francois Sadi, 1191d.
Carnotite, 1487d, 4913a.
Carob, 1191d.
Carol, 1192a.
Carolina grasshopper, 2578a.
Carolina parrakeet, 4512d.
Carolina poplar, 1611a.
Carolina wren, 6361c.
Carolingians, 1192b.
Carotid artery, 7c, 391a. facing 1388.
Carp, 1192c.
Carpals, 2681a.
*Carpathia*, The, 5818c.
Carpathian Mountains, 1193a.
Carpeaux, Jean Baptiste, 5276b.
Carpentaria, Gulf of, 4899b.
Carpenter, Frank George, 1193b.
Carpenter-bee, 656a.
Carpenter's Hall, 4623a.
Carpenters' vise, 6102b.
Carpentry, 1193c.
Carpetbaggers, 1197d, 4950a.
Carpet beetle, 1198a.
Carpets and rugs, 1198a.
Carpet sweeper, 3027b.
Carpet wool, 6354c.
Carracci family, 1200a.
Carragheen, 3056c.
Carrantuohill, 3045d.
Carranza, Venustiano, 1200b, 3772d.
Carrara marble, 1201a.
Carrel, Alexis, 1201a.
Carriage, 1201d.
Carrier pigeon, 1202a.
Carriers of goods, 1514d.
Carriers of passengers, 1515a.
Carroll, Charles, 1202b.
Carroll, Lewis, 200b, 1826a.
Carrot, 1202c.
Carson, Christopher, 1203a.
Carson, Sir Edward, 1203c.
Carson City, Nev., 1204a.
Cartagena, Colombia, 1476c, 1480c.
Cartagena, Spain, 1204b.
Carte blanche, 1204c.
Carter, Mrs. Leslie, 1204c.
Carter-Cotton, Francis L., 1204d.
Carter Dome, 4156a.
Carteret, Sir George, 4168a.
Carthage, Mo., 1206a.
Carthage, North Africa, 1205a, 5059a.
Carthusian cat, 1221b.
Carthusians, 1206b.
Cartier, Sir Georges Etienne, 1206c.
Cartier, Jacques, 1207a.
Cartilage, 1207b.
Cartilaginous tissue, 5818c.
Cartography, 2425a.
Cartoon, 1185b, 1207c.
Cartouche, 1208c.
Cartridge, 1208d.
Cartwright, Edmund, 1208d.
Cartwright, Peter, 1209a, 3439b.
Cartwright, Sir Richard John, 1209c.
Caruso, Enrico, 1210a.
Carver, John, 1210c.
Carver, Jonathan, 4408c.
Carving, 1210c.
Cary, Alice, 1211a.
Cary, Phoebe, 1211a.
Caryatides, 1211c.
Casaba, 1211d.
Casaba melon, 1211d.
Casabianca, 1212a.
Casa dei Bambini, 3916b.
Casa Grande Ruin, 4504b.
Casareep, 1216d.

Cascade, 6216a.
Cascade Locks, 4410a.
Cascade plan, 6218d.
Cascade Range, 1212b.
Cascade Tunnel, 1212d.
Cascara, 1212d.
Case, 1213a.
Casement, Sir Roger, 6161b.
Case method of teaching law, 2710b.
Case of nouns, 4294d.
Casein, 1214b.
Casgrain, Henri Raymond, 1142a, 1214c.
Casgrain, Thomas Chase, 1214c.
Cash (coin), 1468a.
Cash book, 813a.
Cashmere, India, 3215b.
Cashmere goat, 1214d.
Cashmere Islands, 1214d.
Cashmere shawls, 3215c.
Cash register, 1215b.
Casimir the Great, 4724a.
Casino, 1215c.
Casler, Herman, 3989c.
Caspian Sea, 1215d.
Caspian tern, 5761d.
Cass, Lewis, 1216a.
Cassandra, 1216c.
Cassava, 1216d, 5700a.
Cassel, Germany, 1217a.
Cassia, 1217a.
Cassia bark, 1217b.
Cassiopeia, 1217b, 3805c.
Cassiquiare River, 6048c.
Cassowary, 1217c.
Cast, 1217d.
Castalia, Fountain of, 4511c.
Cast coins, 4311c.
Casts, 889c, 1217d.
Castile, 5477b.
Castile and Aragon, 1218a.
Castile soap, 5424c.
Castilloa tree, 903b.
Cast iron, 3058d.
Castle, 1218c.
Castle Garden, 4207c.
Castle of Chillon, 1339b.
Castle of the Holy Grail, 4515c.
Castling (chess), 1304a.
Castor (perfume), 4584d.
Castor and Pollux, 1219b.
Castoreum, 642d.
Castor oil, 1219c.
Castro, Cipriano, 6050d.
Cat, 1220b.
Catacombs, 1222a.
Catalepsy, 1222c.
Catalina Island, 1222d.
Catalpa, 1223a.
Catalyzer, 4702b.
Catamount, 6283b.
*Cat and Mouse* (game), 2376b.
Catania, Sicily, 1223b.
Catapult, 1223b.
Catapult fruits, 5293d.
Cataract, 5025c, 6215d, 6216a.
Cataract (eye), 770a, 1223c.
Cataraqui River, 5014b.
Catarrh, 1224c.
Catawba Indians, 1224c.
Catawba rhododendron, 5003b.
Catbird, 1224d.
Catch-as-catch-can style of wrestling, 6362d.
*Catch the Salmon* (game), 2377d.
*Catch the Squirrel* (game), 2375b.
Catechu, 17d, 1225a.
Caterpillar, 1023c, 1225a.
Caterpillar, Silk, 5382a.
Catesby, Robert, 2642c.
Catfish, 1226b.
Catharine I (Russia), 1226c.
Catharine II, the Great (Russia), 1226d, 5055b.
Catharine de' Medici, 1227a.
Catharine of Aragon, 1227b.
Cathay, 1227d, 4744c.
Cathedral, 1227d.
Cathedral City, 4435d.
Cathedral of Milan, 3795d.
Cathedral of Notre Dame, 4292d.
Cathedral of Rheims, 4992b.
Cathedral of Saint Isaac, 4612c.
Cathedral of Saint John the Divine, 4209d.
Cathedral of Saint Mark's, 5162a.
Cathedral of Saint Paul, Minn., 3831c, 5164d.
Cathedrals of England, 2036d.
Catherine wheel window, 5083d.
Cathode rays, 1229b.
Catholic University of America, 1229c.
Catiline, 1229d, 1377b.
Cation, 2000b, 3032a.
Cat Island, 3844b.
Catkin, 1230b.
Catmint, 1230c.
Catnip, 1230c.
Cato, Marcus Porcius (234-149 B. C.), 1230d.
Cato, Marcus Porcius (95-46 B. C.), 1231b.
Cato of Utica, 1231b.
Cato the Censor, 1230d.
Cato the Elder, 1230d.
Catskill aqueduct, 307d.
Catskill Mountains, 1231c.
Catsup, 3233c.
Catt, Carrie Chapman, 1231d.
Cat tail, 1232a.
Cattegat, 1232c.
Cattaro, Austria, 1692c.
Cattermole, 1232d.
Cattle, 1233a.
Cattle plague, 5020a.
Cattle tick, 3866d.
Catullus, Caius Valerius, 1238c,
Caucasia, 1238d.
Caucasian race, 4909c.
Caucasus, 1238d.
Caucasus, Mount, 4836d.
Caucasus Mountains, 1239a.
Caucus, 1239b.
Cauliflower, 1239d.
Caulking, 4325c.
Caulter's whitefish, 6273d.
Cause of ocean currents, 4333d.
Causes of trusts, 5892a.
Cause used for effect, 3757d.
Caustic, 1240a.
Caustic alkali, 202a.
Caustic potash, 281d, 1240a, 4793b.
Caustic soda, 1240a, 5429c.
Cavaletti, Stephen, 6058d.
Cavalieri, Lina, 1240a.
Cavaliers, 1240c.
*Cavalleria Rusticana*, 1240c.
Cavalry, 1240d, 5677d.
Cavalry division, 380a.
Cavalry regiment, 4962a.
Cavalry sword, 5666b.
Cavalry trumpet, 5890c.
Cave, 1241b.
Cave crickets, 2578a.
Cave dwellers, 1241d.
Cave men, 1241d.
Cavendish family, 1781d.
Cave of the Winds, 4225d.
Cavern, 1241b.
Caviar, 1242b.
Cavite, P. I., 1242d.
Cavour, Count Camillo Benso di, 1243a.
Cawein, Madison Julius, 1243b.
Cawnpore, India, 1243c.
Cawnpore Memorial, 5306a.
Caxton, William, 1243c.
Cayambe, Mount, 5449d.
Cayenne, French Guiana, 1243d.
Cayenne lapwing, 3333a.
Cayuga and Seneca Canal, 1147a, 4216d.
Cayuga Indians, 1244a.
Cayuga Lake, 1244b
Cebu, P. I., 6409c.
Cebu Island, 4632d.
Cecilia, Saint, 1244b
Cecrops, 1244c.
Cedar, 1244c.
Cedar Creek, Battle of, 5348b.
Cedar Lake, Sask., 5217c.
Cedars of Lebanon, 1244d, 3363d, 4645a.
Cedar partridge, 4519b.
Cedar Rapids, Ia., 1245b.
Cedar waxwing, 6227c.
Cedrela, 3598c.
Ceiling beams, 1194d.
Celaeno, 4707a.
Celebes Island, 1245d.
Celery, 1246b.
"Celery City," 1246d.
Celestial equator, 2067a.
Celestial globe, 2511c.
Celestial pole, 4731c.
Celestine (Popes), 1246d.
Celilo Canal, 4406b.
Celilo Falls, 1692b.
Celion, Mount, 5317c.
Cell, 1247a.
Cell division, 4848a.
Cellini, Benvenuto, 1247b.
Cello, 6089c.
Celluloid, 1247c.
Cellulose, 1247d, 4318c.
Celman, Juarez, 339b.
Celtiberians, 5476d.
Celtic people, 1248b.
Celts, 1248b.
Cements, 1248c.
Cementum, 5729a.
Cenis, Mount, 1249b.
Cenozoic Era, 1240c, 2438d, 2441c.
Censer, 1249c.
Censitaires, 5294d.
Censors, 1249d.
Censorship of moving pictures, 3992b.
Census, 1250a.
Census Bureau, 1512c.
Cent, 1251a, 1468a.
Centaur, 1251c.
Centaurea, 3198c.
Centaurus, 1251d.
Centavo, 1468a.
Centennial Exposition, 1252a.
Centennial State, 1484b.
Center-fire cartridges, 5409d.
Center of gravity, 2579a.
Center of the United States, 3207a.
Centesimo, 4604b.
Centigrade, 1252b, 5786d.
Centime, 1468a.
Centimeter, 1252c.
Centimeter-gram-second, 3881c, 5942b.
Centipede, 1252c.
Central America, 1253a.
Central-American Court, 1254b.
Central Falls, R. I., 1254c.
Centralia, Ill., 1254c.
Central India Agency, 804a, 3588b.
Central Pacific Railroad, 4920d.
Central Park, N. Y., 4210b.
Central time, 5524b.
Centrifugal force, 1254d.
Centrifugal pump, 4870a.
Centripetal force, 1255a.
Centrosphere, 1903a.
Centuriata, 1511a.
Century plant, 1255a.
Cephalonia Island, 3032c.
Cephalopoda, 1255c.
Cephalothorax, 5256a.
Ceramic art, 4796b.
Cerebus, 1255d.
Cereal grasses, 2577a.
Cerealia, 1256b.
Cereals, 2553d.
Cerebellum, 892a.
Cerebral meningitis, 3733b.
Cerebrospinal meningitis, 3733b.
Cerebrospinal system, 4120b.
Cerebrum, 891d.
Ceres, 1256b, 4844a.
Cereus, 1039c.
Cerium, 1294c.
Cerro Blanco, Mount, 4172b.
Cerro de Pasco, Peru, 4600d.
Cerro Gordo, Battle of, 1256b.
Certificate of stock, 5554b.

Certificates of deposit, 578a.
Certified checks, 1289c.
Certified public accountant, 471b.
Certosa di Pavia, 4531b.
Cerularius, 2610b.
Cerulean warbler, 6137a.
Cerussite, 1178c.
Cervantes Saavedra, 1256c.
Cervical vertebrae, 5398d.
Cesnola collection of antiquities, 3761b.
Cetacea, 1257b.
Cetewayo, 6419d.
Cette, France, 3932d.
Cettinje, Montenegro, 1257c.
Cevennes Mountains, 1257c.
Ceylon, 1257d.
Ceylon, Rapid transit in, 417d.
Chacabuco, Battle of, 5196d.
Chacalaca, 2630d.
Chacma, 525d.
Chad, Lake, 1258d.
Chadwick, George Whitfield, 1259a.
Chaeronea, Battle of, 2607a, 4628a.
Chaffinch, 1259a.
Chagres River, 4468d, 4472a.
Chain, 1259b.
Chain lightning, 3429b.
Chain of Rocks, 5159b.
Chain stitch, 5328d.
Chalazae, 1960d.
Chalcedony, 1259c, 4886d.
Chalcidid fly, 5195c.
Chalcocite, 1574a.
Chaldea, 1259d.
Chalk, 1260a.
Challener, Frederick Sproston, 1260c.
Challenger Expedition, 1260d, 4728d.
Châlons, Battle of, 469a, 2167c.
Chambered nautilus, 4089d.
*Chambered Nautilus, The,* 343b, 2812b.
Chamberlain, Joseph, 1261a.
Chamberlain [Joseph] Austen, 1262a.
Chamberlain, Lake, 3601a.
Chamber of Commerce, 1262b.
Chamber of Commerce of the United States, 1262d.
Chambers, Robert William, 1263c.
Chambersburg, Pa., 1263d.
Chameleon, 1264a.
Chambezi River, 1535c.
Chambly Canal, 1147b.
Chambly River, 5011b.
Chaminade, Cecile Louise Stephanie, 1264b.
Chamois, 278c, 1264c.
Chamois skin, 1265a.
Chamomile, 1265a.
Champagne, 1265a.
Champaign, Ill., 1265b.
Champan, 1480b.
Champ de Mars, 4495d.
Champignon mushroom, 4014b.
Champlain, Samuel de, 1120b, 1266a.
Champlain Canal, 1147a, 4216d, 6066d.
Champlain Lake, 1265c.
Champlevé method, 2030b.
Champollion, François, 2793d.
Champs Elysées, 1266d.
Chancellor, 1266d.
Chancellor of the Exchequer, 1267a.
Chancellorsville, Battle of, 1267a.
Chancery, Court of, 1267c, 2067d.
Changa, 3878a.
Changchun, China, 3996a.
Channel base, 4953a.
Channel Canal, 1147a.
Channel Islands, 1267c.
Channing, William Ellery, 1267d.
Channing, William Henry, 1630d.
Chansons de geste, 2333b.
Chanterelle mushroom, 4014c.
Chantilly lace, 3290b.
Chanute, Kan., 1268a.
Chaos, 4042b.
Chapala, Lake, 3768c.
Chaparral, 1060d, 1268b.
Chaparral cock, 5027d.
Chaplain, 1268b.
Chaplain, Prison, 4828a.
Chapleau, Sir Joseph Adolphe, 1268d.
Chapman, George, 1269a.
Chapter (masonry), 3681a.
Chapter houses, 2319c.
Chapter Rose Croix, 3681b.
Chapultepec, Battle of, 1269b.
Charade, 1269c.
Charcoal, 1269d.
Charcoal pencils, 1270b.
Chard, 1270c.
Charge (heraldry), 2776d.
Chargé d' affaires, 1270c.
*Charge of the Light Brigade,* 546c, 1270d.
Chariot, 1271b.
Charis, 6118a.
Charity, 1271c.
Charity, Sisters of, 1272d.
Charlemagne, 1273a.
Charleroi, Pa., 1274b.
Charles I (Austria), 1278c.
Charles (England), 1274c-1275c.
Charles (France), 1275b-1276d.
Charles (Holy Roman Empire), 1277a-1277c.
Charles (Sweden), 1277c-1278c.
Charles XIV John, 5651a.
Charles Augustus, Prince of Weimar, 2521d.
Charles Edward, 5593d.
Charles Martel, 1278c.
Charles-Michel de l' Epée, 1719b.
Charles's law, 2401c, 2890c.
Charles Stephen (Austria), 4725a.
Charles the Bald, 1275b.
Charles the Fair, 1275d.
Charles the Fat, 1275b.
Charles the Great, 1273b.
Charles the Simple, 1275b.
Charles the Wise, 1275d.
Charleston, S. C., 1278b.
Charleston, W. Va., 1279d.
Charlevoix, Mich., 1280c.
Charlevoix, Pierre Francis Xavier de, 1280b.
Charlotte, N. C., 1280c.
Charlotte Amalie, Virgin Islands, 5168b, 6100d.
*Charlotte Corday in Prison,* 1578b.
Charlottenburg, Germany, 1281a.
Charlottetown, P. E. I., 1281a.
Charms, 5634b.
Charon, 1281c.
Charr, 5885d.
Chart, 1282a.
Charter, 1282b.
Charterhouse, 1206b.
Charter Oak, 1282b.
Chartism, 1282d.
Charybdis, 5278b.
Chase, Salmon Portland, 1283a.
Chase, Samuel, 2935d.
Chassis, 513b.
Chat, 1283c.
Château Laurier, 4427c.
Chatham, Earl of, 4685c.
Chatham, N. B., 1283c.
Chatham, Ont., 1283d.
Chattahoochee River, 1284a.
Chattanooga, Battles of, 1285b.
Chattanooga, Tenn., 1284b.
Chattel, 1285d.
Chattel mortgage, 3959b.
Chattel real, 1286a.
Chattels personal, 1286a.
Chaucer, Geoffrey, 1286a.
Chaudière Falls, 4426d.
Chaudière River, 1286c.
Chauffeur, 1286d.
Chaulmooga oil, 3384d.
Chautauqua, 1287a.
Chautauqua Institution, 1287b.
Chautauqua Lake, 4196c.
Chautauqua Literary and Scientific Circle, 1287c.
Chautauqua Mountains, 4359d.
Chautauqua muskellunge, 4034a.
Chautauquas, Local, 1287d.
Chauveau, Pierre Joseph Olivier, 1142b, 1287d.
Cheaha, Mount, 130d.
Cheap money, 3886a.
Check, 1288a.
Checkers, 1290a.
Checkmate, 1304c.
Chedabucto Bay, 4296d.
Cheese, 1291a.
"Cheesebox on a raft," 3890c.
Cheese mite, 3866d.
Cheese press, 4624d.
Cheeta, 1292b.
Chehalis River, 6187d.
Chelan, Lake, 6187d.
Chelsea, Mass., 1292c.
Cheltenham, England, 1292d.
Chemical affinity, 469d, 1296c.
Chemical analysis, 244c.
Chemical compounds, 1294c, 1295d.
Chemical energy, 5562a.
Chemical engines, 2181b.
Chemical mineralogy, 3818a.
Chemical reactions, 4936b.
Chemical styptics, 5597b.
Chemical symbols, 1296d, 5669a.
Chemise, Envelope, 5326c.
Chemistry, 1293a.
Chemistry, Bureau of, 106b.
Chemistry of foods, 2242d.
Chemnitz, Germany, 1299a.
Chenab Canal, 3065c.
Cheney, Benjamin P., Jr., 398c.
Cheops, 1299a, 4878b.
Chephren, 4879a.
Cheque, 1288a.
Cherbourg, France, 1299b.
Cherokee Indians, 1299c.
Cheroots, 5825d.
Cherry, 1300b.
Cherry birch, 728b.
Cherry brandy, 1301b.
Cherry bud, 976b.
Cherry laurel, 1301b, 3344b.
Chersonesus, 1301c, 3194d.
Cherub, 1301c.
Cherubini, Maria Luigi Carlo Zenobio Salvatore, 1301d.
Chesapeake and Delaware Canal, 1147a.
Chesapeake and Ohio Canal, 1302a.
Chesapeake Bay, 1302b.
Chesapeake Bay dog, 4980b.
Chess, 1302d.
Chest, 1305c.
Chester, 1305d.
Chester, George Randolph, novelist, 1306b.
Chester, Pa., 1306c.
Chester Basin, 4296d.
Chesterfield, Philip Dormer Stanhope, Earl of, 1306d.
Chesterton, Gilbert Keith, 1307a.
Chester white hog, 2806b.
Chestnut, 1307b.
Chesuncook Lake, 3601a.
"Chevalier Bayard," 630a.
Cheviot Hills, 1308a, 2583d.
*Chevy Chase,* 557d.
Chewing gum, 2641a.
Chewing tobacco, 5825b.
Cheyenne, Wyo., 1308c.
Cheyenne Indians, 1308b.
Cheyenne River, 5465a.
Cheyenne River Reservation, 5463b.
Chiaroscuro, 1308d.
Chica, 2153d.
Chicago, Ill., 1309a.
Chicago, University of, 1317a.
Chicago Drainage Canal, 1318a.
Chicago Heights, Ill., 1318c.
"Chicago of the South," 461a.
Chicago plan, 1009d.
Chicago River, 1309c.

Chicago Sanitary and Ship Canal, 1318a.
Chichagof Island, 135d.
Chickadee, 5821c.
Chickahominy River, 1318d.
Chickamauga, Battle of, 1318d.
Chickamauga National Military Park, 1319b, 2454c.
Chickaree, 5518b.
Chickasaw Bluff, 3730c.
Chickasaw Indians, 1319b.
Chickasha Okla., 1319c.
Chicken hawk, 2540d, 2723d.
Chicken raising, 4799b.
Chicken pox, 1319d.
Chicle, 1320a, 2641a.
Chicopee, Mass., 1320a.
Chicory, 1320c.
Chicoutimi, Que., 1320d.
Chief boatswain, 788a.
Chief Justices of Supreme Court, 5639d.
Chief of staff, 5520a.
Chiffon, 1321a.
Chigger, 3151d.
Chignecto Bay, 235b.
Chignon, 2661b.
Chigoe, 2206b.
Chihuahua, Mexico, 1321a.
Chilblain, 1321c.
Child, 1321b.
Child, Observing the, 3927d.
Childermas, 2996c.
Child labor, 1326a.
Child-labor laws, 1327b.
Child psychology, 4861b.
Children, Eye defects of, 1946d.
Children, Literature for, 3461a.
Children, Physical defects of, 1944c.
Children, Societies for, 1327c.
*Children of Charles I*, 4450.
*Children of the Shell*, 4450.
Children's Bureau, 1327d, 3339d.
Children's Crusade, 1652d.
"Children's House," 3917b.
Children's museums, 1951b.
Children's poet, The, 3495d.
Childress, Sarah, 4742b.
Childs, George William, 1328a.
Child study, 1328b.
Chile, 1330b.
Chile con carne, 1338b.
Chile saltpeter, 5178d.
Chili, 1330b.
Chillicothe, O., 1338c.
Chilliwack, B. C., 1339a.
Chillon, 1339a.
Chillon, Château of, 2417c.
Chills and fever, 3610d.
Chilon, 5318d.
Chimaera, 1239b.
Chimborazo, Mount, 1339c.
Chimney, 1339c.
Chimpanzee, 1340b.
China, 1340b.
China ink, 2995b.
China kiln, 1354d.
China painting, 1353c.
China Sea, 1355b.
"China's Sorrow," 2803b.
Chinatown, San Francisco, 5191c.
Chinaware, 4762d, 4798a.
Chincha Islands, 2631b.
Chinch bug, 1355c.
Chinchilla, 1356a.
Chinchon, Condessa of, 4603b.
Chinchona, 1379c.
Chin dynasty, 1348b.
Chine, 4763d.
Chinese arrowroot, 4115c.
Chinese City, 4552d.
Chinese Exclusion, 394b, 1068a, 1356b, 1420c.
"Chinese Gordon," 1349d, 2537b.
Chinese-Japanese War, 1356c.
Chinese pagodas, 4445d.
Chinese pear, 4542c.
Chinese peonies, 4577c.
Chinese sacred lily, 4068d.
Chinese silver pheasant, 4619b.
Chinese Turkestan, 5906d.
Chinese wax insect, 6227b.
Chinook, 1100c, 1356d.
Chinook Indians, 1357a.
Chinook salmon, 5174b.
Chinquapin, 1308a.
Chios Island, 5254c.
Chipmunk, 1357a.
Chippendale furniture, 2355b.
Chippewa Indians, 4357d.
Chipping sparrow, 5482a.
Chiricahua Indians, 290a.
Chiron, 1357b.
Chiropodist, 1592d.
Chiropractic healing, 1357c.
Chiroptera, 1357d.
Chishima Island, 3281c.
Chiton (dress), 1860b.
Chitons, 1357d.
Chittim-wood bark, 1212d.
Chivalry, 1358a.
Chlopkowski, Bozenta, 3871b.
Chloral, 1358b.
Chloral, Antidote for, 282a.
Chloride of lime, 1807b, 1358c
Chloride of sodium, 5175d.
Chlorine, 1358c.
Chlorine zones, 1887c.
Chloris, 4121c.
Chloroform, 1360a.
Chlorophyll, 1360b, 2084d.
Choate, Joseph Hodges, 1360c.
Choate, Rufus, 1360c.
Chocolate, 1360d, 1457a.
Chocorua Peak, 6275b.
Choctaw Indians, 1361b.
Choice, 6287b.
Choke cherry, 1300d.
Choke damp, 1179b.
Cholera, 1361c.
Cholera infantum, 1362a.
Cholera morbus, 1362a.
Chopin, Frederic Francois, 1362d.
Chord (geometry), 1386a.
Chords (music), 4031c.
Chorea, 5168c.
Chorley, Henry F., 4322b.
Choroid, 2118b.
Chorus, 1363a.
Chosen, 1363b.
Chosen Marine Products Association, 1365b.
Chouteau, Auguste, 3862b, 5161a.
Chowchow, 4662b.
Chow dynasty, 1347d.
Chrissie, Lake, 5863c.
Christ, 3144b.
Christchurch, N. Z., 1366c.
Christ Church, Philadelphia, 4623b.
Christian IX (Denmark), 1366d.
Christian X (Denmark), 1367a.
Christian Catholic Church, 1848c.
Christian Church, 1087a, 1801d.
Christian Endeavor, Young People's Society of, 1367a.
Christian Era, 1367c, 2066b.
Christiania, Norway, 1367c.
Christian idea of God, 2519b.
Christianity, 1368a.
Christianity, Statistics of, 4965b.
Christian monasticism, 3882d.
Christian Pentecost, 4576c.
Christian Reformed Church, 4961c.
Christian Science, 1368b.
*Christ in the Temple*, 4450.
Christmas, 1370a.
*Christmas Carol, A*, 1370c.
Christmas gifts for kindergartens, 3245a.
Christmas Island, 4647a, 5390b.
Christmas programs, 1369a.
Christmas rose, 2764a.
*Christ of the Andes*, 339d, 342a.
Christopher North, 4249a, 6299d.
Christy, Howard Chandler, 1370d.
Christy Minstrels, 3837c.
Chromatic scale, 1371a, 4029b.
Chrome, 1371a.
Chrome green, 1371c.
Chrome tanning, 5698c.
Chrome yellow, 1371c, 3356a.
Chromic iron ore, 1371b.
Chromite, 1371b.
Chromium, 1371c.
Chromium steel, 1371c.
Chromosphere, 5624b.
Chronic gastritis, 2406b.
*Chronicles, Books of*, 1371c.
Chronology, 1371d.
Chronology, Biblical, 708a.
Chronometer, 1372a.
Chrysalis, 1023d, 1372b, 3752c.
Chrysanthemum, 1372c.
Chrysostom, John, Saint, 1373a.
Chub, 2185a.
Chuck, 658d.
Chugach National Forest, 138d.
Chunghua, 1340d.
Church, 1373b.
Church calendar, 6385c.
Church gains, United States, 5951a.
Churchill, Lady, 264d.
Churchill, Winston, 1373c.
Churchill, Winston Leonard Spencer, 1374a.
Churchill River, 1374b.
Church of Christ, Scientist, 1368b.
Church of England, 1374d.
Church of Jesus Christ of Latter-Day Saints, 3949c, 6398a.
Church of the Holy Sepulcher, 1651a.
Church of Saint Sophia, 5167c.
Churn, 1375c.
Churubusco, Battle of, 1376a.
Chyle, 1376b, 3543c.
Chyme, 1376b.
Cibber, Colley, 4758d.
Cicada, 1376b.
Cicely, 1376d.
Cicero, Marcus Tullius, 1376d.
Ciconians, 4343b.
Cid, The, 1377d.
Cider, 1378a.
Cider vinegar, 1378b, 6087d.
Cienfuegos, Cuba, 1378b.
Cigar, 5825c.
Cigarette, 1378c.
Cilia, 1379a.
Ciliary muscle, 2118b.
Cimabue, Giovanni, 4448d.
Cimbri, 1379b.
Cimbric Peninsula, 3194d.
Cimon, 1379c.
Cimri, 6125b.
Cinchona, 1379c, 4603c.
Cinchonine, 202d.
Cincinnati, O., 1380a.
Cincinnati, Society of the, 1382d.
Cincinnati, University of, 1383b.
Cincinnati Riot, 1382c.
Cincinnatus, Lucius Quinctius, 1383d.
"Cincinnatus of the West," 1383d.
Cinderella, 1384a.
Cineraria, 1384b.
Cinnabar, 1384c, 3742d.
Cinnamon, 1384d.
Cinnamon bear, 637b.
Cion, 2549b.
Cion grafting, 2550b.
Cipango, 1500c, 3115b.
Circassia, 1385b.
Circassians, 1385b.
Circe, 1385c.
Circle, 1385d.
Circuit courts (U. S.), 1614a.
Circuit court of appeals, 1614a.
Circular saw, 5227b.
Circulating capital, 1172d.
Circulating libraries, 3402c.
Circulation of sap, 5203c.
Circulation of the blood, 776a, 1387d, facing 1288, 3745c.
Circumference, 1385d.
Circus, 1388d.
Circus Maximus, 1390b, 5063d.
Circus menagerie, 2655d.
Cirrhosis, 1390c.
Cirrus cloud, 1438c.
Cisalpine Gaul, 2408a.

Cis-Caucasia, 1238d.
Cistern, 4978b.
Cistercian Order, 3883d.
Citation, 4830d.
Cithara, 6413c.
Cities, Growth of, 1392b.
Cities in Canada, Fifty largest, 1394a.
Cities in the United States, Fifty largest, 1393c.
Cities of Refuge, 1390d.
Cities of the world, Fifty largest, 1393b.
Citizen, 1390d.
"Citizen Genet," 2416d.
Citlaltepetl Mountain, 3767d.
Citric acid, 1391c, 3379a.
Citron, 1391d.
Citrus, 1392a, 3378a.
City, 1392a.
City charter, 4004b.
City editor, 4185a.
City manager, 1395a.
"City of Allah," 203a.
"City of Brotherly Love," 4620b.
"City of David," 1709d.
"City of Eternal Spring," 1922a.
"City of Homes," 4621a.
"City of Oaks," 4926b.
"City of Peter," 4611b.
*City of Savannah*, 5225a.
"City of the Seven Hills," 5057c.
"City of the Straits," 1777a.
City planning, 1395b.
City Point, Va., 4608c.
City schools, 5239d.
City states, 1395c, 2604d.
City training schools, 5246a.
City water supply, 2887a.
Ciudad Bolivar, Venezuela, 4413c.
Ciudad Juárez, Mexico, 2017d.
Civet, 1395d, 4584c.
Civic Federation, National, 1396a.
Civics, 1397a.
Civil death, 1396c.
Civil engineer, 2033b.
Civil government, 1396b.
Civility, Washington's rules of, 2085b.
Civilization, 1398a.
Civilization to-day, 1400a.
Civil law, 1401c.
Civil list, 1401d.
Civil service, 2732d.
Civil service commission, 1402c.
Civil service in Canada, 1404a.
Civil service in the United States, 1402a.
Civil service law, 1402b.
Civil service reform, 1403c, 5989d.
Civil War (Rome), 5059d.
Civil War in America, 6144a.
Claiborne, William, 1404d, 3676c.
Claiborne's Rebellion, 1404d.
Claims, Court of, 1405a.
Clairvoyance, 1405b.
Clam, 1405c.
Clammy locust, 3482a.
Clan, 1406a.
Clapper rail, 4915c.
Clarendon, Edward Hyde, Earl of, 1406c.
Claret, 1406d.
Clarinet, 1407a.
Clark, Champ, 1407a.
Clark, Charles E., 6067d.
Clark, Charles Heber, 1407c.
Clark, Francis Edward, 1407c.
Clark, George Rogers, 1407d, 4988d.
Clark, William, 1408a.
Clarke, John, 4999b.
Clarke's crow, 4314b.
Clarksburg, W. Va., 1408b.
Clark University, 1408c.
Classes of nouns, 4294a.
Classes of poultry, 4800a.
Classes of pronouns, 4837b.
Classical period, 1408d.
"Classic City of the South," 456b.
Classic orders, 1409a.
Classics, 1408d.
Classification, 1409a.
Classification in botany, 861c.
Classification of sentences, 5303c.
Classified service, 1402d.
Claude Lorrain, 2412a.
Claudian Aqueduct, 1410c.
Claudius, 115c, 1410b.
Clavicle, 5399b.
Claxton, Philander Priestly, 1410d.
Clay, 1411a
Clay, Henry, 1411b, 5722a.
Clay and sand products of the United States, 5964a.
"Clay City," 6407d.
Clay modeling, 1411c.
Claymore, 947c.
Clay pipe, 4681c.
Clay soil, 5431d.
Clayton, John M., 1413c.
Clayton Anti-Trust Act, 6204a.
Clayton-Bulwer Treaty, 1413c, 5720a.
Clean bill of health, 4884d.
Cleanliness, 3416a.
Clean-up days, 6349c.
Clear grits, 4736a.
Clearing house, 1413d.
Cleavage, 1414c.
Cleaveland, Moses, 1428a.
Cleburne, Tex., 1414d.
Cleek, 2531d.
Clef, 4022c.
Cleft grafting, 2551a.
Clematis, 1415a.
Clemens, Samuel Langhorne, 1415c.
Clement, 1416c.
Clement (Popes), 1416c.
Cleobulus, 5318d.
Cleopatra, 1417a.
Cleopatra's Needles, 1417c.
Clerestory, 325d.
Clerical tonsure, 5835d.
*Clermont*, The, 3132b.
Cleveland, Grover, 1418a.
Cleveland, Mount, 2502b.
Cleveland, O., 1425b.
Cleveland Memorial Tower, 4822d.
Click beetle, 1428c.
Cliff dwellers, 1429a.
Cliff - dwellers' palace (color plate), facing 2962.
Cliff dwellings, 359d.
Cliff dwellings in the Chaco Cañon, 4175a.
Clifford, Nathan, 4738d.
Cliffs of Dover, 2038c.
Cliff swallow, 5643b.
Cliff Walk, Newport, R. I., 4181b.
Clifton Bridge, Ont., 4223b.
Climate, 1430b.
Climate and crops division of weather bureau, 6232a.
Climatic chart, 1282a.
Climatic zones, 6415d.
Climax, 1432c.
Clingman's Peak, 761a.
Clingstone peach, 4538c.
Clinton, DeWitt, 1432d.
Clinton, George, 1433b.
Clinton, Sir Henry, 1433c.
Clinton, Ia., 1433d.
Clinton, Mass., 1434b.
Clinton, Ont., 1432d.
Clio, 4012b.
Clisthenes, 1434c.
Clive, Robert, Baron Clive of Plassey, 1434d.
Cloaca Maxima, 318d, 2275a, 5062d.
Clock, 1435a.
Clodius, Publius, 1377b.
Clog, 838a.
Cloisonné method, 2030a, 4056a.
Cloister, 1437a.
Cloister of the Colonies, 6023d.
Closed-circuit batteries, 1981d.
Closed gentian, 2420c.
Closed season (fishing), 258a.
Closed shop, 4388d.
Close punctuation, 4870d.
Clotbur, 1455a.
Cloth, 1437b.
Clothes moth, 3970c.
Clothier's teasel, 5727b.
Clothing, Adulteration of, 63b.
Clothing, Proper, 3411c.
Clotho, 2141c.
Cloth of gold (flower), 1642c.
Cloth parchment, 4479d.
Cloud, 1438a, 4921c.
*Cloud, The*, 1439a.
Cloud-burst, 1439b.
Cloud Peak, 6371d.
Clouds and electricity, 3428d.
Cloud's Rest, 6397c.
Clove hitch knot, 3270b.
Clover, 1439b.
Cloves, 1440b.
Clovis, 1440d.
Clown among birds, 1283c.
Club, 1441a.
Club skate, 5397d.
Clumber spaniel, 5479d.
Cluny lace, 1441c.
Cluny Order, 3883d.
Clutha River, 4219d.
Clyde River, 1441d.
Clydesdale horse, 2840c.
Clydesdale terrier, 5402d.
Clymene, 4616d.
Clytemnestra, 1442c.
Cnossus, 3288d, 3837a.
Coach horse, 2840b.
Coal, 1442a.
Coal areas, 1444b.
Coal booklet, 1447c.
Coal fields of the United States, 5956a.
Coal gas, 282a, 2401b.
Coalition, 1448b.
Coal mining, 1446b, 3822a.
Coal oil, 3233a.
"Coal sack," 3805c.
Coal tar, 259b, 1448d.
Coal tar indigo, 2972c.
Coastal plain, 1449a.
Coast and Geodetic Survey, 1449c.
Coast artillery, 406a.
Coast defense gun, 405b.
Coast defense ships, 6181a.
Coast guard, 3420b, 4981c.
Coast Range, 1057a, 1450b.
Coastwise shipping, 3741c.
Coatesville, Pa., 1450c.
Coaticook, Que., 1450d.
Coat of arms, 2776a.
Coat-of-arms of Columbus, 1503a.
Coats' and Clark's thread, 4456c.
Coats of the stomach, 5558d.
Cobalt, 1450d.
Cobalt, Ont., 1451b.
Cobalt blue, 1451a.
Cobb, Irvin Shrewsbury, 1451c.
Cobden, Richard, 1451d, 4549c.
Cobequid Mountains, 4296d.
Cobourg, Ont., 1452a.
Cobra, 1452b.
Cobwebs, 5497c.
Coca, 202d.
Cocaine, 202d, 282a, 1453a.
Coccus, 5229d.
Coccyx, 4555d, 5399b.
Cochin-China, 1453b.
Cochineal, 1453d.
Cochlea, 1899c.
Cochrane, Francis, 1454b.
Cochrane, Ont., 1454a.
Cockatoo, 1454b, 4513d.
Cockburn Island, 3633d.
Cockchafer, 1454d.
Cockfighting, 1454d.
Cocklebur, 1455a.
Cockle button, 1002b.
Cock of the rock, 1455b.
Cock paddle, 3535b.
Cockroach, 1455c.
Cockscomb, 1455d.
Cockspur, 5187b.
Cocoa, 1456a.

Cocoa beans, 1456b.
Cocoa butter, 1457a.
Cocoanut, 1457b.
Cocoanut charcoal, 1270b.
Cocoanut palm, 1457d, 4461d.
Cocoanut-stearin, 1574c.
Cocoon, 1458a.
Cod, 1458c.
Code Napoleon, 1459c.
Codes, Telegraph, 5734c.
Code writing, 1459d.
Codex Vaticanus, 6040c.
Codling moth, 1460a.
Cod-liver oil, 1460c.
Codrus, 1460d.
Cody, William Frederick, 1461a.
Coeducation, 1461b.
Coefficient, 188d.
Coelenterata, 1461d.
Coeruleum, 1451a.
Coeur d' Alene, 2912d.
Coeur d'Alene, Ida., 1462a.
Coffee, 1462b.
Coffee drying, 901d.
Coffee sugar, 5615b.
Cofferdam, 1464c.
Coffeyville, Kan., 1464d.
Coffin, 1465a.
Coffin, Charles Carleton, 1465c.
Cognac, 895c.
Coherer, 6321d.
Cohesion, 1465d.
Cohoes, N. Y., 1466a.
Coho salmon, 5174c.
Cohosh, 5420b.
Coin, Parts of, 4311c.
Coinage, 1466b.
Coins, 1466d.
Coins, Foreign, 1467d.
Coins, Gold, 2523b.
Coins, Rare, 4311d, 4312a.
Coke, 1468b.
Coke coal, 1443b.
"Coke fiend," 1453a.
Colbert Shoals Canal, 1147a.
Colborne, Sir John, 1469a, 4767b.
Colbraith, Jeremiah Jones, 6299b.
Colchicum, 1469a.
Colchis, 343d.
Cold (infection), 1469b, 3415c.
Col de la Perche Pass, 4879c.
Col de Somport Pass, 4879c.
Cold-pack method of canning, 2248a.
Cold-pressed oils, 4357b.
Cold storage, 1469c.
Cold-water method of canning, 2248a.
Cold wave signals, 2737b, 6230b.
Coleman, Alta., 1471c.
Coleman, Arthur Philemon, 1471c.
Coleman, W. T., 1722a.
Coleoptera, 661b, 3000c.
Coleridge, Samuel Taylor, 1471d, 1472b.
Colfax, Schuyler, 1472c.
Colic, 1472d.
Coligny, Gaspard de, 1472d.
Coliseum, 1495d.
Coliseum Peak, 4101d.
Collar-and-cuff industry, 5889a.
Collar and elbow style of wrestling, 6362d.
Collar bone, 5399b.
Collared peccary, 4546c.
Collatinus, Lucius Tarquinius, 3531a.
Collective bargaining, 1473a.
Collective nouns, 4294b.
Collective ownership, 5425c.
College, 1473b.
College, Sacred, 5137d.
College of Cardinals, 1182d, 4756a.
College of Pontiffs, 4752b.
College of the City of New York, 4216a.
Colleges for women, 1474a.
Collegiate institute, 1473d.
Collie, 1474b.
Collier, John Payne, 1474c.
Collimator, 5488c.
Collingwood, Ont., 1474c.
Collins, Mount, 4380a.
Collins, [William] Wilkie, 1474d.
Colmar, 214c.
Colocasia, 1475a.
Cologne (perfume), 4585b.
Cologne, Prussia, 1475a.
Cologne Cathedral, 1228a, 1475c.
Colombe, Michel, 5275d.
Colombia, Republic of, 1475b.
Colombo, Ceylon, 1480c.
Colon (coin), 1468a.
Colon, Panama, 1480d.
Colon, Use of, 4871d.
Colonel, 1481a, 4929a.
Colonial Dames of America, 1481b.
Colonial flags (British), 2198a.
Colonial possessions of Great Britain, 2586a.
Colonial revenue stamps, 5522c.
Colonial time, 5524b.
Colonies, Administration of British, 2589b.
Colonies, Thirteen, 5976d.
Colonies and colonization, 1481c.
Colonies of France, 2300c.
Colonies of the world, 1482b.
Colonna family, 4416a.
Colonus, 4344c.
Color, 1482b.
Colorado, 1484b.
Colorado, University of, 1493d.
Colorado beetle, 4795b.
Colorado River, 1494a.
Colorado Springs, Colo., 1494d.
Color blindness, 1495c.
Colored glass, 2509c.
Colored pencils, 4558a.
Color exercises (Montessori Method), 3920a.
Color of hair, 2659d.
Color photography, 4650d.
Color printing, 4824a.
Colors of postage stamps, 4788a.
Colosseum, 1495d, 5061c.
Colossus, 1496b.
Colossus of Rhodes, 1496c, 5000d, 5318d.
Colt, Samuel, 4990a.
Colter, John, 6371b.
Coltsfoot, 1497a.
Colt's tail, 2207a.
Columba, 3843b.
Columbia, 1500a.
Columbia, Mo., 1497b.
Columbia, Mount, 154a, 1497b.
Columbia, Pa., 1497c.
Columbia, S. C., 1497d.
Columbian Order, 5694c.
Columbia River, 1498c.
Columbia River Highway, 1499a.
Columbia School of Journalism, 4867b.
*Columbia's Emblem*, 1584a.
Columbia University, 1499a.
Columbine, 1499c, 2690d.
Columbium, 1294c.
*Columbus*, 1501d.
Columbus, Christopher, 1500a, 6072d, 6358d.
Columbus, Diego, 5201c.
Columbus, Ga., 1504c.
Columbus, Ind., 1505b.
Columbus, Miss., 1505b.
Columbus, O., 1505d.
Columbus day, 4340c.
Columbus day program, 1504a.
Column, 324a, 1507b.
Column formation (naval), 5678a.
Column of July, 3185c.
Column of Trajan, 5858c.
Comanche Indians, 1508b.
Combination corset cover and petticoat, 5326d.
Combination lock, 3474b.
Combing wool, 6354c.
Combustion, 1508c.
Comedy, 1508d, 1852a.
Comedy, Father of, 2141d.
Comenius, John Amos, 1509b.
Comet, 1509d.
Comic opera, 4390b.
*Coming of the Corn, The*, 5573c.
*Coming Storm, The*, 4450.
Comitia, 1510d, 5057d.
Comma, Use of, 4871a.
Commandants, 4785b.
Commander Islands, 135c.
Commanders of Knights Templars, 3681b.
Commandments, Ten, 1725d.
Commerce, 1511a.
Commerce, Bureau of Foreign and Domestic, 1512c.
Commerce, Chamber of, 1262b.
Commerce, Chamber of, of the United States, 1262d.
Commerce, Department of, 1512b.
Commerce Court, United States, 3023c.
Commerce of the United States, 5964b.
Commercial agency, 1512c.
Commercial agents, 1562a.
Commercial education, 1955d.
Commercial geography, 2429a.
Commercial hotels, 2848a.
Commercial languages of the world, facing 3326.
Commercial law, 1512d.
Commercial paper, 4111a.
Commercial patterns for sewing, 5325d.
Commercial sponges, 5506d.
Commercial treaties, 5868b.
Comminuted fracture, 2293a.
Commission (business), 949a.
Commissioned officers, 379b.
Commissioner of Education, 1953d.
Commissioner of Internal Revenue, 5867c.
Commissioner of Public Lands, 3309b.
Commission form of government, 1513a.
Commissure, 2119b.
Committee of Public Safety, 5035c.
Committee of the Whole, 1514a.
Committees of Congress, 1538a.
Committees of Correspondence, 1514a, 4985a.
Commodore, 1514b, 4929b.
Common carrier, 1514c.
Common council, 1515a.
Common errors in use of adjectives, 55c.
Common errors in use of conjunctions, 1541a.
Common factor, 2124d.
Common fractions, 2282b.
Common fractions, Cube root of, 1665c.
Common gender, 2415c.
Common law, 1515b, 3349a.
Common nouns, 4294a.
*Common Prayer, Book of*, 256c.
Common schools, 5237b.
Commons, House of, 4508a.
Common starling, 5532a.
Commonwealth of Australia, 483b.
Commonwealth of England, 1515c.
Commune, 1516a.
Commune of Paris, 1516a.
Communication, Rural, 99b.
*Communion of Saint Jerome*, 4450.
Communism, 1516c.
Communist manifesto, 3669a.
Community center, 99d, 1516b.
Community Christmas tree, 1370c.
Community forum, 1517d.
Community interests, 1516b.
Commutation in arithmetic, 3999b.
Commutation of sentence, 4492b.
Commutator, 1894c.

Como, Lake, 1519b.
Comoro Islands, 81d.
Comox, Vancouver, 6033a.
Company Canal, 1147a.
Company officers, 4929b.
Company of New France, 1120c.
Company of the Hundred Associates, 1120c.
Company of the West, 1120c.
Comparative anatomy, 245c.
Comparative grammar, 2556a.
Comparison of adjectives, 55a.
Comparison of adverbs, 65b.
Comparative degree, 1519c.
Comparison, 1519b.
Compass, 1520d.
Compass saw, 5227b.
*Compleat Angler, The,* 257a, 6133a.
Complementary colors, 1483d.
Complete metamorphosis, 3752b.
Complete predicate, 5303c.
Complete subject, 5303c.
Complex fractions, 2291a.
Complex sentence, 5304a.
Composite family, or Compositae, 1521d.
Composite number, 2124a.
Composition and arithmetic, Measuring scale for, 1937b.
Composition of air, 118b.
Composition of forces, 1522b.
Composition of sun, 5625a.
Compound, 3878a.
Compound fracture, 2293a.
Compound lever, 3393a.
Compound microscope, 3791c.
Compound motor, 1997a.
Compound personal pronouns, 4837c.
Compound sentence, 5304a.
Compounds of silver, 5385d.
Compound spectroscope, 5488a.
Compressed air, 1522c, 5901d.
Compressed yeast, 6386c.
Compressive strength, 5592a.
Compromise of 1850, 1523b, 4666c, 5517a, 5720d.
Comptroller of the Currency, 5867b.
Comptroller of the Treasury, 5867b.
Compulsory education, 1941b, 1948a.
Compulsory military system, 3799d.
Compulsory system of pensions, 4366b.
Comte, Isidore Auguste Marie Francois Xavier, 1523c.
Comstock Lode, 805a, 4135c.
Conanicut Island, 4069c, 4997b.
Concave mirror, 3841d.
Concept, 1524a.
Concertina, 1524b.
Conch, 1524b.
Conciergerie, 4496c.
Conclave, 1524d.
Conclusion (logic), 4946a.
Concord, Mass., 1525a, 3396d.
Concord, N. C., 1525b.
Concord, N. H., 1525c.
Concordat, 1526a, 5868a.
*Concord Hymn,* 2023a.
Concrete, 1526b.
Concrete nouns, 4294a.
Concrete roads, 1527c.
Conde, Prince of, 2866b.
Condemnation proceedings, 2026b.
Condensed milk, 3804c.
Condenser, 1809c, 3398a, 6323d.
Condimental foods, Adulteration of, 61c.
Conditional pardon, 4492b.
Condor, 1528a.
Condor (coin), 1468a.
Conduction of heat, 2748d.
Conductive anesthesia, 1769c.
Conductor, Electrical, 1984c.
Conduits, Sewerage, 5321d.
Conduit system, electric railway, 1998b.
Cone, 1528c.
Cone-bearing trees, 1529b.
Cone clutch, 515a.
Conestoga Indians, 1530a.
Conestoga wagon, 6122d.
Coney Island, N. Y., 1530a.
Coney Island of Boston, 4982b.
Confederacy, United Daughters of the, 1530d.
Confederate army societies, 1530c.
Confederate Cabinet, 6146c.
Confederate capitol, 1711c.
Confederate Congress, 6146c.
Confederate memorial on Stone Mountain, 5560b.
Confederate monument, Antietam, 283b.
Confederate monument, New Orleans, 3517b.
Confederate States of America, 1531a.
Confederate Veterans, United Sons of, 1530d.
Confederation, Articles of, 401a, 5979c.
Confederation of Canada, 1124a.
Confederation of the Rhine, 2478c.
Conference of the governors, 1552c.
Confessed judgment, 3180a.
Confirmation, in the Roman Catholic Church, 5052a.
Confucianism, 1533c.
Confucius, 1533a.
Congenital blindness, 768d.
Congenital cataract, 1223d.
Congenital insanity, 2998a.
Conger eel, 1959c.
Congested districts board, 3049c.
Conglomerate, 1533d.
Congo, 1534a.
Congo Free State, 1534a, 3383d.
Congo River, 1535b.
Congregational Church, 1536a.
Congregation of the Holy Office, 2997d.
Congress, 1536b.
Congress Hall, 4622d, facing 4625.
Congressional districts, 4973c.
*Congressional Globe,* 1536d.
Congressional Library, 3405a.
*Congressional Record,* 1536d.
Congress of Berlin, 1536d.
Congress of Mothers, 4074a.
Congress of Paris, 1536c.
Congress of the United States, 1537a, 5974b.
Congress of Vienna, 1536a.
Conifers, 1529b, 2264b.
Conjugation, 1539b, 6057b.
Conjunction (astronomy), 1540a.
Conjunction (grammar), 1540a.
Cunjunctiva, 2119a, 3291c.
Conjunctivitis, 769a.
Conjuring, 1541c.
Conkling, Roscoe, 1543c, 4703c.
Connaught, Arthur William Patrick Albert, 1543d.
Conneaut, O., 1544c.
Connecticut, 1544b.
Connecticut River, 1550d.
Connecticut wrappers, 1546b.
Connective tissue, 5818b.
Connellsville, Pa., 1551a.
Connor, Ralph, 2537c.
*Conquest of Peru,* 4603a.
Consanguinity, 3659d.
Conscription, 1551c, 3800b, 6306d.
Consequent of a ratio, 4843a.
Conservation, 1551b, 4676c.
Conservation of energy, 2032c.
Conservative, 1553c.
Conservative party in Canada, 4736a.
Conservatoire de Musique, 1553d.
Conservatory, 853c, 1553c.
Consistory, 3681c.
Consolidated schools, 100a, 5241a.
Consonant, 1554a.
Consort, Queen, 4898d.
Conspiracy, 1554a.
Constable (officer), 1554b.
Constance, Lake, 1554b.
Constantine, Caius Flavius Valerius Constantinus, 1554d.
Constantine I, 1555a.
Constantinople, 1555b, 5907d, 6159a.
Constantza, Rumania, 5104c.
Constellation, 1557d.
Constipation, 3413d.
Constituent Assembly, 2335a.
Constitution, 1558a.
Constitution, State, 1548b.
*Constitution,* The, 1558b.
Constitutional government, 2546d.
Constitutional law, 3349d.
Constitutional monarchy, 3882c.
Constitutional revolution, 4983c.
Constitutional Union party, 1558d.
Constitution of the United States, 1559a, 5980c.
Construction of triangles, 5876a.
Construction of words, 5670b.
Constructive imagination, 2933a.
Consul, 1561d.
Consul-general, 1561a.
Consumption (disease), 5895c, 5896a.
Consumption (economics), 1562b.
Contact poisons, 3002b.
Container for the thing contained, 3757d.
Contempt, 1562d.
Continental climate, 1341d.
Continental deposits, 4333a.
Continental Divide, 2018a.
Continental Hall, 1707d.
Continental islands, 3071a.
Continental shelf, 4333a.
Continental slope, 4333a.
Continental System, 1562d.
Continental telegraph code, 5735a.
Continents, comparative sizes, 4656d.
Continuation schools, 1943c, 5241c.
Continuous bath, 624d.
Continuous spectrum, 5488d.
Contraband, 1563a.
Contract, 1563b.
Contractor, 986a.
Contributory negligence, 4111a.
Controlled torpedo, 5842b.
Convection of heat, 2748c.
Convention, Political, 4734a.
Convex mirror, 3842b.
Convex surface, 1680c.
Convict labor, 1564b.
Convolvulus, 1565a.
Conway, Hugh, 2136c.
Conway, Thomas, 1033b, 4988c.
Conway Cabal, 1033b.
Conway River, 6124c.
Cony, 4671d.
Cook, Frederick Albert, 1565a, 3569c, 4544b, 4726b.
Cook, James, 1565c, 4728b.
Cooke, Jay, 1565d.
Cooke, W. F., 6264c.
Cookery, 1566a.
Coolie itch, 3087a.
Coolies, 943d.
Coon, 4907d.
Cooper, James Fenimore, 1567c.
Cooper, Peter, 1568b.
Cooperage, 600c.
Coöperation, 1569a, 3284a.
Coöperative banking, 1569d.
Coöperative buying, 1569b.
Coöperative creamery, 1627c.
Coöperative selling, 1569c.
Cooper's Creek, 1570a.
Cooper's hawk, 2724a.
Cooper Union, 1568d.
Coördinate conjunctions, 1540b.
Coosa River, 1570b.
Coot, or mud hen, 1570b.
Copais, Lake, 2604c.

Copal, 5692d, 6038b.
Copenhagen, Denmark, 1570d.
Copernican system, 1571d.
Copernicus, 440a, 1571b.
Copley, John Singleton, 1571d.
Copper, 1572a.
Copperas, 1573d.
Copper carbonate solution, 3002d.
Copper Cliff, Ont., 1573d.
Copper compounds, 1573b.
Copper glance, 1574a.
Copperhead, 1574a.
Copper-nosed sunfish, 5629c.
Copper pyrite, 4879d.
Copper Range, 3782c.
Copper sulphate, 783d, 5620a.
Copper sulphate solution, 3002c.
Copp's Hill Burial Ground, 2065d.
Copra, 1574c.
Copts, 1574c, 1966a.
Copyhold, 6085b.
Copying camera, 1081a.
Copying inks, 2995a.
Copyright, 1574d.
Coquelin, Benoit Constant, 1576c.
Coquille River, 4403c.
Coral, 1576c.
Coral fungi, 2350a.
Coralline algae, 184a.
Coral mushroom, 4014c.
Coral reefs, 1577a.
Coral sea, 1577c.
Corbel, 1577d.
Corbett, James J., 4830c.
Corbie steps, 2357d.
Corcoran, Mount, 1057b.
Corcoran, William Wilson, 1578a.
Corcoran Art Gallery, 1578a.
Corcyra, 4555a.
Cordage, 5078d.
Corday d'Armont, 1578d.
Cordillera, 249b, 1578c.
Cordillera Central, 1477b.
Cordilleran highland, 5948a.
Cordillera Occidental, 1477b.
Cordillera Real, 796d.
Cordite, 1578d, 5417c.
Cordoba, Argentina, 1578d.
Cord of stone, 1666a.
Cord of wood, 1666c.
Cordova, Argentina, 1578d.
Cordova, Spain, 1579a.
Corduroy, 1579b.
Corduroy road, 1579b.
Corea, 3277b.
Corelli, Marie, 1579b.
Core Sound, 4467b.
Corfu Island, 3032b.
Coriander, 1579c.
Corinth, Greece, 1579c.
Corinth Canal, 1149a, 1580d.
Corinthian column, 1507d.
Corinthians, 1581a.
Corinto, 4227c.
Coriolanus, 1581b.
Corisco Island, 5476b.
Cork, 1581c, 5474b.
Cork, Ireland, 1583a.
Cork elm, 2017a.
Corm, 1583b.
Cormack, G. W., 3266d.
Cormorant, 1583c.
Corn, Indian, 1584a.
Cornaro, Count, 3409c.
Corn-club, 1588c.
Corn crake, 4915c.
Corn crib, 1666d.
Cornea, 2118b.
Corneille, Pierre, 1590d.
Cornelia, 1042a.
Cornelian, 1190d, 4886d.
Cornelius, Peter von, 1591a.
Cornell, Alonzo B., 2734a.
Cornell, Ezra, 1591d.
Cornell University, 1591a.
Corner, 786d.
Cornflower, 2228a, 3198b.
Cornice, 1507d.
Corning, N. Y., 1592a.
Corn laws, 928c, 1592b, 4549c.
Corn marigold, 3652a.
Corns, 1592c.
Corn smut, 5418a.
Cornstarch, 5530c.
Corn thief, 1648b.
Cornwall, Ont., 1592d.
Cornwall Canal, 1147b.
Cornwallis, Charles, Marquis, 1593a.
Coroa, 3809b.
Corolla, 2223c.
Corollary, 2445b.
Corona, 1593b, 5626b.
Coronado, Cal., 5188a.
Coronado, Francisco Vasquez, 1593b.
Coronary artery, facing 1388, 391a.
Coronary vein, facing 1388.
Coronation, 1593c.
Coronation chair, 1593d.
Coroner, 1594a.
Coroner's jury, 3192d.
Corot, Jean Baptiste Camille, 1594b.
Corporal, 1594c, 4929a.
Corporal punishment, 1594d.
Corporation, 1595a, 5554b.
Corporations, Bureau of, 1512c.
Corporation tax, 2938b.
Corpus Christi, Tex., 1596a.
Corpuscles, 775b.
*Corpus Juris Civilis*, 3193d.
Correggio, Antonio Allegri, 1596b.
Correlation (teaching), 1596c.
Correspondence schools, 5248c.
Corrientes, 4489d.
Corrigan, Michael Augustine, 1596d.
Corrodentia, 3000c.
Corrosive sublimate, 282a, 1596d, 3742d.
Corruption of blood, 466c.
Corset cover, 5326b.
Corsica, 1597a.
Corsicana, Tex., 1597c.
Corsican pine, 4678b.
Cortereal (navigator), 4300c.
Cortes, 5476c.
Cortez, Hernando, 1597d, 3771a.
Cortina d' Ampezzo, 1835a.
Cortland, N. Y., 1598c.
Corundum, 1598d.
Coshocton, O., 1599a.
Cosimo Medici, 3717b.
Cosmoline, 6038d.
Cosmos, 1599b.
Cossack asparagus, 1232c.
Cossacks, 384d, 1241b, 1599c.
Costa, Señora Angela de, 342a.
Cost accounting, 21c.
Costa Rica, 1599d.
Coster, Laurens, 4824b.
Costigan, John, 1600d.
Costilla, Mount, 4172b.
Cost of pavements, 5030a.
Cost of production theory, 6025c.
Cost of plastering, How to estimate, 4701a.
Cost of War of Secession, 6150a.
Cost of wars, 6135c.
Costume, 1601a.
Costumes of the Crusades, 1651d.
Coteau des Prairies, 3836a.
Côte Saint Catherine, 4432a.
Cotes, Sara Jeannette Duncan, 1603a.
Cotopaxi, 1603c.
Cotrone, Battle of, 4425d.
Cotswold sheep, 5342a.
Cotton, 1603b, 3731a.
Cotton, Adulteration of, 63b.
Cotton, John, 1610a.
Cotton belt, 125c.
Cotton booklet, 1608a.
Cotton bolls, 1605d.
Cotton boll weevil, 801d, 6239d.
Cotton fiber, 2160c.
Cotton gin, 1606b, 1610b, 6277d.
Cotton moth, 3869c.
Cotton-mouth (snake), 1574b.
Cottonseed meal, 1607b.
Cottonseed oil, 1610c.
Cotton State, 124a.
Cottontail, 2689a.
Cotton thistle, 5793a.
Cottonwood, 1610d, 4759c.
Cottonwood bud, 976b.
Cotyledon, 1611a.
Couch grass, 1611c, 2576d.
Cougar, 4868d.
Cough, 1611d.
Coulées, 161c.
Coulomb, 1612a.
Council Bluffs, Ia., 1612a.
Council-mayor plan, 4004c.
Council of blood, 219a.
Council of Kadosh, 3681b.
Council of Pisa, 4683c.
Council of Royal and Select Masters, 3681b.
Council of Trent, 5873b.
Council of Workmen's and Soldiers' Delegates, 5123a.
Counter currents, 1996a.
Counterfeiting, 1612c.
Counter-Reformation, 1612d, 4960d.
Countersign, 4512c.
Counting, Table for, 1765d.
*Count of Monte Cristo*, 3911d.
Country life conditions, 98c.
County, 1613a.
County officials, 1613b.
County type of government, 5976a.
Coupon bonds, 807d.
*Coureurs de bois*, 1122b.
Court-martial, 1613c.
Court of Appeals, 1615c.
Court of Appeals (Dist. of Col.), 1614b.
Court of Claims, 1614b.
Court of Private Land Claims, 1614b.
Courtois, B., 3030d.
Court plaster, 1613d.
Courtral, Battle of, 4629b.
Courts, 1613d.
*Courtship of Miles Standish*, 1615d.
Courts in Canada, 1118b, 1615b.
Courts in Great Britain, 1615c.
Courts of the United States, 1614a.
Covenant, Ark of the, 363c.
*Covenant Code*, 4576b.
Covenanters, 1616d.
Coventry, 1617a.
Cove of Cork, 4900c.
Coverdale, Miles, 1617a.
Covington, Ky., 1617b.
Cow, 1617d.
Cow barn, 594a.
Cowberry, 1623a.
Cowbird, 999b, 1618b.
Cow bunting, 1618b.
Cowlitz River, 6187d.
Cow parsnip, 1618d.
Cowpens, Battle of, 4989c.
Cowper, William, 1619a.
Cowpox, 6018b.
Cowrie, 1619c.
Cowslip, 1619d, 4817c.
Cox, Palmer, 1620b.
Coyote, 1620b, 6343d.
Crab, 1620d.
Crab-eating raccoon, 4908a.
Crab spider, 5498b.
Crab tree, 1621b.
Cracow, Poland, 1621d.
Craddock, Charles Egbert, 4008a.
Cradle, Mount, 5708c.
Cradle of Liberty, 2135b.
Cradle of the Confederacy, 3931b.
Cradle of the Russian Empire, 4242b.
Cradles of Indians, 2966d.
Craft guilds, 2636a.
Craig, Sir James Henry, 1622a.

Craigie, Pearl Richards, 1622d.
Craigie House, 3495b.
Craig-y-Nos, 4528b.
Craik, Dinah Maria Mulock, 1622c.
Cranberry, 1622c.
Cranbrook, B. C., 1623a.
Crane (bird), 1623b.
Crane (machine), 1623d.
Crane, Stephen, 1624b.
Crane, Walter, 1624c; bookplate, 829c.
Craneberry, 1622d.
Crane fly, 1685d.
Crane's-bill, 2462b.
Cranial nerves, 4121a.
Cranium, 5399b.
Crank shaft, 515c.
Cranmer, Thomas, 1624d, 2771b.
Crannogs, 3301c.
Cranston, R. I., 1625b, 4998a.
Crape, or Crêpe, 1625c.
Crassus, Marcus Licinius, 1625d, 5484a.
Crater, 6110c.
Crater Lake, 4410b, 6112a.
Crater Lake National Park, 4504b.
Crater Peak. 5338b.
Craters on the moon, 3940c.
Crawfish, 1625d.
Crawford, Francis Marion, 1626b.
Crawford, Isabella Valancey, 1143b, 1626c.
Crawford, Thomas, 1626c.
Crawford, William H., 5759c.
Crawford Notch, 4155d, 6274d.
Crawford Notch Valley, 293c.
Crawford peach, 4538d.
Crawfordsville, Ind., 1626d.
Crawl, The, 5657c.
Crayfish, 1625d.
Crayons, 1627a.
Cream, 1018d, 3802b.
Creamery, 1627b.
Cream-nut, 908a.
Cream of tartar, 1628a.
Cream separator, 1628a.
Creasy, Edward Shepherd, 2168a.
*Creation of Man*, 4450.
Creation of the world, Myths regarding, 4042b.
Creative imagination, 2933a.
Crécy, 1628d.
Credit, 1628d.
Credit, Letter of, 1629b.
Credit Mobilier of America, 1629c.
Creed, 1630b.
Cree Indians, 1630a.
Creek Indians, 1630d, 4364c.
Creek War, 1631a.
Creeper, 1631a.
Creeping Charlie, 3547b.
Creeping thyme, 5804d.
Crefeld, Germany, 3278b.
Crehan, Ada, 4963b.
Cremation, 1631c.
Crematorium, 1631d.
Cremazie, Octave, 1140a, 1142b.
Crembalum, 3151d.
Cremona, Italy, 6089b.
Crenides, 4627d.
Creole, 1631d, 3996a.
Creole State, 3512b.
Creosote, 1631d.
Crêpe, 1625c.
Crescendo, 4022a.
Crescent, 1632a, 4952b, 5911a.
Crescent City, 4178b.
Crescentius, 4426a.
Cresol, 1807b.
Cress, 1632c.
Crested grebe, 2599d.
Crested redbird, 1182d.
Cretaceous Period, 2441b.
Crete, 1633a.
Crete de la Neige, 3191d.
Cretonne, 1633c.
Crevasses, 2501b.
Cribbage, 1633d.
Cricket (game), 1634d.
Cricket (insect), 1634b.
*Cricket on the Hearth*, 1634c.
Cricoid cartilage, 3336d.
Crime, 1636a, 1638b.
*Crime Against Kansas, The*, 5623b.
Crimea, 1637a, 4235c.
Crimean War, 1270d, 1637c, 4230a, 4235c.
Criminal intent, 1636b.
Criminal law, 1401b, 1636d.
Criminology, 1637d.
Crimson clover, 1440a.
Crinan Canal, 5261a.
Crinoidea, 1639d.
Crinoline, 1640a.
Cripple Creek, Colo., 1493b, 1640a.
Crispi, Francesco, 149b.
Cristoforí, Bartolommeo, 4660a.
Cristoforo Colombo, 1500a.
Critias, 5791a.
Crittenden, John, 1640c.
Crittenden Compromise, 1640c.
Croatan Sound, 4467a.
Croatia and Slavonia, 1640d.
Croatians, 5311b.
Crochet needle, 4110a.
Crockett, David, 1641b.
Crocodile, 1641c.
Crocodile bird, 3333a.
Crocodile tears, 1642b.
Crocus, 1642b.
Croesus, 1642c, 1750d.
Crofting, 766c.
Croghan, Dr. John, 3616d.
Croker, Richard, 5695b.
Crompton, Samuel, 5499c.
Cromwell, Oliver, 1642d.
Cromwell, Richard, 1643d.
Cromwell, Thomas, 1644a.
Cronstadt, Russia, 3278d.
Crookneck squash, 5516b.
Crookes, Sir William, 1644b.
Crookes tubes, 1644c.
Crop (anatomy), 2498d.
Crop rotation, 101b.
Crops, Measures for, 1666b.
Croquet, 1645a.
Crore of rupees, 5108a.
Crosby, Fanny, 1645d.
Cross, 1646a.
Crossbill, 1646c.
Crosscut saw, 5227c.
Cross Eclectic Shorthand, 5339c.
Cross-eye, 5517d.
Cross Fell, 2038b.
Cross-fertilization, 255c, 858b, 1647a.
Crossing (biology), 1001b, 1647c.
Cross of gold speech, 4398a.
Cross-pollinated flowers, 4743a.
Cross section of orange, 4394a.
Cross section of submarine, 5601b.
Cross section of tree, 5871b.
Cross-vine, 715c.
Crothers, Thomas Wilson, 1647c.
Crotona, Italy, 4880c.
Croton aqueduct, 307c.
Croup, 1647d.
Croupier, 5090d.
Crow, 1648a.
Crow blackbird, 1649a.
Crow Creek Reservation, 5463b.
Crowfoot, 1021a.
Crow Indians, 1649a.
Crown, 1649c.
Crown (coin), 1468a, 1649b.
Crown (of arch), 318c.
Crown grafting, 2551c.
Crown lands, 3309d.
Crown of cups, 1981a.
Crown of trees, 5870d.
Crown Point, N. Y., 1650a.
Crown Prince Frederick William, 2473d.
*Crucifixion, The*, 5817c.
Cruelty to Animals, Society for the Prevention of, 1650b.
Crucible steel, 5542a.
Cruciferae, 4037d.
Crude petroleum, 4614d.
Crude sap, 5203c.
Cruikshank, George, 1650c.
Crupper, 2691d.
Crusades, 1650d, 4609a.
Crustaceans, 1653b.
Crustaceous lichens, 3406b.
Cryolite, 218b.
Crypt, 1653d.
Crypt of Saint Cecilia, 1222b.
Cryptogams, 1654a, 5508a.
Crystal detector, 6321c, 6328b.
Crystal-gazing, 1813d, 4858d, 5598c.
Crystalline lens, 2118d.
Crystalline rocks, 1654a.
Crystallization, 1654b.
Crystallized silica, 5381c.
Crystallography, 3817d.
Crystal Palace, 4670b.
Ctesibus of Alexandria, 4411c.
Cuba, Republic of, 1655a, 2569d.
Cuba and the mosquito, 3968b.
Cuban courtship, 1657d.
Cube, 1662a.
Cubebs, 1662b.
Cube root, 1662c.
Cubic decimeter, 3758a.
Cubic measure, 1665c, 1764b.
Cubic meter, 3759a.
Cubist school of painting, 1667a.
Cuckoo, 1667c.
Cucumber, 1668a.
Cud, 5106d.
Cue, 717d.
Culebra Cut, 4473c.
Culex mosquitoes, 3966d.
Culion leper colony, 3385a.
Cullinan diamond, 1786c, 2414b.
Cullom, Shelby Moore, 1668c.
Cultivation of rice, facing 5006.
Cultivation of the voice, 6109d.
Cumaean sibyl, 5371b.
Cumberland, Md., 1668d.
Cumberland, R. I., 1669a.
Cumberland Gap, 1669b.
Cumberland Mountains, 1669b.
Cumberland Presbyterians, 4810b.
Cumberland River, 1669b.
Cumberland Road, 1669c.
Cummins, Albert Baird, 1670a.
Cumorah Hill, 3950b.
Cumulus cloud, 1438c.
Cuneiform inscriptions, 1670c.
Cuneiform writing, 432a.
Cunningham claims, 143d.
Cunaxa, Battle of, 1683d.
Cup fungi, 3250a.
Cupid, 1671b, 4856c.
Cupola, 1671c.
Curacao, D. W. I., 1671c.
Curassow, 1671d.
Curative inoculation, 2997b.
Curb trading, 5556a.
Curculio, 1672a.
Curecanti Needle, 1491c.
Curetes, 4991d.
Curfew, 1672b.
*Curfew Must Not Ring To-night*, 1672c.
Curiata, 1510d.
Curie, Pierre and Marie Sklodowska, 1672d.
Curing of ham, 2672d.
Curled maple, 747c.
Curled mint, 3838b.
Curlew, 1673a.
Curling, 1673b.
Curly-grained redwood, 5310b.
Currant, 1674a, 2602c.
Currency, 3887a.
Current, Electric, 1674c, 1986a.
Currents, Ocean, 4333a.
Currents of the Atlantic Ocean, 463a, 4334d, 4335a.
Currents of the Indian Ocean, 4335c.
Currents of the Pacific Ocean, 4335a.
Curtis, Cyrus H. K., 4771a.

Curtis, George William, 1675b.
Curtis, Glenn Hammond, 1675c.
Curtis Act, 2192d.
Curtis Publishing Company, 4623d.
Curve, 1676a.
Curvilinear angle, 256a.
Curvilinear plane, 4694d.
Curzon, George Nathaniel, Lord, 1676b.
Cush, 4239b.
Cushing, Caleb, 4666b.
Cushing, Frank H., 6420b.
Cushman, Charlotte Saunders, 1676c.
Custer, George Armstrong, 1676d.
Custis, George Washington Parke, 1677a, 6208b.
Custis, Martha Dandridge, 6202c.
Custis, Mary Parke, 3366d.
Customs duties, 1677b, 5417d.
Cutbank Pass, 1812b.
Cutch, 2526a.
Cut glass, 2509b.
Cuticle, 5400b.
Cutlery, 3267c.
Cutter (ship), 6378d.
Cutting the Gordian knot, 2537a.
Cuttlefish, 1677c.
Cutler, Manasseh, 4355c.
Cutworm, 1678a.
Cuvier, George Leopold Chretien Frederic Dagobert, Baron, 1678b.
Cuxhaven, 2674a.
Cuyahoga Falls, 4348c.
Cuyahoga River, 4348c.
Cuyp, Albert, 4454b.
Cuyuna Range, 3829a.
Cuzco, Peru, 1678c, 4693c.
Cyanide, 1678d.
Cyanogen, 1678d.
Cybele, 4991d.
Cycads, 1678d.
Cyclades, 1679a.
Cyclamen, 1679a.
Cyclometer, 5489d.
Cyclone, 1679c.
Cyclonic storms, 1679d, 5563a.
Cyclopedia, 2030b.
Cyclopes, 1680b.
Cycloramic camera; 1081a.
Cylinder, 1680c.
Cylinder printing press, 4825d.
Cylinders (Montessori Method), 3919b.
"Cynic," The, 1798d.
Cynic School of Philosophy, 1681d, 4641d.
Cynosarges, 1682a.
Cynoscephalae, Battle of, 5789d.
Cynosure, 4277d.
Cypress, 1682a.
Cypress Hills, 5216a.
Cyprus, 1682c.
Cyrenaica, 477d, 5881d.
Cyrenaic School of Philosophy, 4641d.
Cyrnos, 1597b.
Cyrus (the Younger), 1683c.
Cyrus the Great, 1683a, 3716c, 4595a.
Cytisine, 3288d.
Czar, 1683d, 5821a.
Czarevitch, 1683d.
Czarina, 1683d.
Czar Reed, 4956c.
Czech, 1683d.
Czernowitz, 1684c.
Czolgosz, Leon, 3573d.

# D

D, 1685a.
Dachshund, 1685a.
Dactylic meter, 3755d.
Daddy-long-legs, 1685c.
Daedalus, 1685d.
Daffodil, 1686a.
Dago Island, 6164d.
Dagon, 4683d.
Daguerre, Louis Jacques Mande, 1687a.
Daguerreotype, 1686c.
Dahlia, 1687a.
Dahomey, 1687c.
Dahr el-Kodib Mountain, 3364a.
Daido River, 1364b.
Daily rotation of the earth, 1904a.
Daimios, 5184b.
Dairy husbandry, 1688a.
Dairying, 1688a; intensive, 3010a.
Dairy type cattle, 1234d.
Daisy, 1690b.
Dakin's solution, 6361b.
Dakota Indians, 5392d.
Dakota River, 4270a.
Dalai-Lama, 3302c, 5807a.
Dalbergia tree, 5084a.
Daleth, 1685c.
Dalhousie, N. B., 1690d.
Dalhousie University, 1690d.
Dallas, George, 4737a.
Dallas, Tex., 1691a.
Dalles, 1498d, 1692a.
Dalles-Celilo Canal, 1146c, 1147a.
Dalmatia, 1692c.
Dalmores, Charles, 1692d.
Daly, John Augustin, 232c.
Dam, 1693a.
Damascus, Syria, 1693c.
Damascene gun barrels, 5362b.
Damascus steel, 1694a.
Damascus turban, 5904a.
Damask, 1694b.
Dame schools, 5238a.
Damien, Father, 3880c.
Damocles, 1694b.
Damon, Esther S., 4575b.
Damon and Pythias, 1694c.
Damrosch, Leopold, 1694c.
Damrosch, Walter Johannes, 1694d.
Damson plum, 4710b.
Dams on the Mississippi, 3853b.
Dan, 659b.
Dana, Charles Anderson, 1695a.
Dana, James Dwight, 1695b.
Dana, Richard Henry, 1695c.
Danae, 4591a.
Danbury, Conn., 1696a.
*Dance of the Nymphs*, facing 1595, 4450.
Dances, New, 1697b.
Dancing, 1696b.
Danco Land, 2552c.
Dandelion, 1697d.
Dandie Dinmont, 5764a.
Dandruff, 1698a.
Danelagh, 183c.
Daniel, 1698b.
Daniell cell, 1982c.
Daniel Webster's plow, 4709a.
Danish mile, 3796d.
Danish national hymn, 2893d.
Danish West Indies, 6100c.
Dan Patch, 4908d.
Dannecker, Johann, 5276c.
Dan River, 5033b.
Dante Alighieri, 1698d.
*Dante's Dream*, 4450.
Danton, Georges Jacques, 1699d.
Danube Canal, 6083b.
Danube River, 1700a.
Danvers, Mass., 1700c.
Danville, Ill., 1700d.
Danville, Va., 1701a.
Danzig, Germany, 1701b.
Danzig River, 6102c.
Daphnae, Egypt, 4611c.
Daphne, 1701c, 3344b.
Daphnia, 1701d.
Dardanelles, 1702a.
Dardanelles campaign, 6158d.
"Dardanelles of America," 1777a.
Dardanus, 1702d.
Dar-es-Salaam, East Africa, 2463d, 5697c.
Darfur, Africa, 1703a.
Darien, 1703b.
Darien Scheme, 1703c.
Darius I, 1703d.
Darius III, 1704a.
Darius, the Median, 1698c.
Darjiling, India, 2797b.
Dark Ages, 90d, 1704a.
Dark Continent, 76a.
Dark room, 4649d.
Dark ruby silver, 5386b.
Darling of the spring, 1667c.
Darling Range, 6247c.
Darling River, 485b, 4183b.
Darmstadt, Germany, 1704b.
Darnley, Lord, 3677c.
Darter, 1704c.
Dartmouth, N. S., 1704d.
Dartmouth College, 1705a.
Dartmouth College Case, 1705b.
Darmouth naval school, 4093b.
Darwin, Australia, 4275a.
Darwin, Charles Robert, 1705c.
Dasaratha, 4927c.
Dash, Use of, 4871d.
Date and date palm, 1706b, 4462b.
Date line, International, 3018d.
Date palm orchard in Tripoli, 5882a.
Daudet, Alphonse, 1707b.
Daughters of the American Revolution, 1707d.
Dauphin, 1708a.
Dauphin, Man., 1708b.
Davenport, Homer, 1185c.
Davenport, Ia., 1708b.
*David* (statue), 3779a.
David I (Scotland), 5261d.
David, King of Israel, 1708d.
David, Jacques Louis, 1710b, 4454d.
*David Copperfield*, 1790b.
*David Harum*, 4304b.
Davies, Sir Louis Henry, 1710c.
Davis, David, 1710d.
Davis, Jefferson 1711a, 3438c.
Davis, John, 4279b.
Davis, Rebecca Harding, 1713c.
Davis, Richard Harding, 1713c.
Davis Lock, 5223a.
Davits, 787d.
Davitt, Michael, 1713d.
Davy, Sir Humphry, 1714a.
Dawes Commission, 2192c.
Dawn, 5923a.
Dawson, George Mercer, 1096d, 1714d, 2432d.
Dawson, Sir John William, 1714c.
Dawson or Dawson City, Alas., 1714b, 3267a.
Day, 1715a.
Day, Jeremiah, 6380d.
Day, William Rufus, 1715b.
Day book, 812a.
Day dreams, 1857a.
Day fly, 3796a.
Daylight Saving, 1715b.
Day lily, 1715c, 3432a.
Day of Rejoicing, 2808b.
Days, Table of, 1053a.
Days of grace, 2548c.
Days of month, 3931c.
Dayton, Alston G., 2936a.
Dayton, O., 1715c.
Deaconess, 1716c.
Dead-letter office, 1717a.
Dead load, 986c.
Deadly nightshade, 678c, 4722a.
Dead Sea, 1717b.
Deaf and dumb, 1718a.
Deaf-mutes, Education of, 1718c.
Deafness, Causes of, 1718a.
Deak, Francis, 2874a.
"Dean of the American stage," 3128d.
Dearborn, Henry, 1720c.
Dear money, 3886a.
Dease River, 2582d.
Death, 1720c.
Death by electricity, 1987a.
Death cup mushrooms, 4014c, 4016a.

Death duties, 2992d.
*Death of Absalom*, 11d.
*Death of Balder*, 4046c.
*Death of the Flowers*, 435b.
Death penalty, 1173d.
Death registration, 4962d.
Death sentence in Canada, 1173c.
Death's-head moth, 1721b.
Death valley, 1721d.
Deathwatch, 1722a.
Debate, 1722b.
DeBeers Consolidated Mines, 5001b.
Debenture bonds, 807a.
Deborah, 1724a.
Deb Raja, 703c.
Debs, Eugene Victor, 1724a.
Debt, 1724c.
Debt, National, 4075d.
Debt of honor, 6120b.
Decalogue, 1725d.
*Decameron*, 789a.
Decatur, Ill., 1726a.
Decatur, Stephen, 1726b.
Decay, 1736c.
Deccan, 1726d.
Deccan College, 4754d.
December, 1727a.
Decemvirs, 1730a.
Deciduous trees, 1730a.
Decimal classification of libraries, 3404a.
Decimal fractions, 1730b, 2282b.
Decimals, Cube root of, 1665b.
Decimus Junius Juvenalis, 3195a.
Deckles, 4480a.
Declaration of Independence, 1735a.
Declaration of London, 3019d.
Declaration of Paris, 3019d.
Declaration of Rights of 1689, 2587a.
Declarative sentence, 5303d.
Declension, 1736b.
Declension of personal pronouns, 4837c.
Declination of stars, 408d, 409a.
Decomposition, 1736c.
Decoration day, 1736d.
Decoration day program, 1737a.
Decoy, 1737c.
Decrescendo, 4022a.
Dedans, 5755d.
Dedham, Mass., 1738a.
Deductive method, 1738a.
Deed, 1738c.
Deep-sea currents, 4333a.
Deep-sea diving, 1814d.
Deep-sea fisheries, 2187a.
Deep-tilling sulky plow, 4709a.
Deer, 1739a.
*Deer Drinking*, 4450.
Deere, John, his first plow, 4709c.
Deer mouse, 1740a.
Default, 3958d.
Defective children, 1325a, 1329d.
Defective teeth, 1946b.
Defendant, 4831a.
Defender of the Holy Sepulcher, 2520a.
Defenestration of Prague, 5791c.
Deficiencies, Mental, 3737a.
Defoe, or De Foe, Daniel, 1740b, 4674c.
DeForest audion, 6328b.
DeForest detector, 6322a.
Degeneration, 1740d.
*Degeneration*, 4246a.
Degree, 1741d.
Degree of latitude, 3342b.
De Groot, Hugo, 2627b.
Deianira, 2780d.
De Kalb, Ill., 1742a.
De Kalb, Johann, 1742b.
De Koven, Anna Farwell, 1742d.
De Koven, Reginald, 1742c.
Delagoa Bay, 1742d.
Deland, Margaretta W. C., 231d.
Delaware, 1743a.
Delaware, or De la Warr, Thomas West, 1748b.
Delaware, O., 1747d.
Delaware and Chesapeake Canal, 1743d, 4570a.
Delaware and Raritan Canal, 1147a, 4165d, 4570a.
Delaware Bay, 1748c.
Delaware Division Canal, 1147a.
Delaware Indians, 1747c.
Delaware River, 1747c, 4566a.
Delaware Water Gap, 1748c.
Delcassé, Théophile, 1748d.
Delegate, 1749a.
Delft, Netherlands, 1749b.
Delfthaven church, 4125b.
Delhi, India, 1749c.
Delhi durbar, 1749d.
Deliberation, 6287a.
Delible ink, 2995b.
Delilah, 1750a, 4638d.
Delirium tremens, 1750b.
De Long, George W., 4727d.
De Long Mountains, 137a.
Delos, Confederacy of, 1750c.
Delos, Island of, 1750c.
Delphi, Greece, 1750c.
Delsarte, François Alexandre, 1751a.
Delsarte system, 1750d.
Delta, 1751b, 5025c.
Delta of the Mississippi, 3853a.
Delta of the Yukon, 6404d.
Deltoid muscle, 373a.
Deluge, 1751d.
Delusion, 4659a.
Demand and supply, 1918b, 6025b.
Demarcation, Line of, 1752b.
Demavend, Mount, 1976a.
Dementia, 2998a.
Dementia praecox, 3739a.
Demes, 453b.
Demeter, 1256b.
Demetrius, 1681d.
Demetrius Poliorcetes, 4880a.
De Mille, James, 1143a, 1752d.
"Democratic donkey," 4071d.
Democratic party, 1753a, 4735a.
Demoiselle crane, 1623d.
Demonology, 1754c, 6341a.
Demonstration, 2445b.
Demonstrative pronouns, 4838d.
Demosthenes, 1754d, 4628a.
Demotic writing, 2793c.
Demurrer, 1755c.
Denarius, 1755c.
Denatured alcohol, 167d.
Deniker's classification of mankind, 4909d.
Denis, Portugal, 4782d.
Denis, Saint, 4412d.
Denison, George Taylor, 1143d, 1756c.
Denison, Tex., 1755d.
Denmark, 1756b.
Denmark, Flag of, 2198d.
Denominate numbers, 1763a.
Dent, John Charles, 1142c, 1768b.
Dent, Miss Julia, 2567c.
Dental schools, 1769d.
Dent corn, 1585c.
Dentine, 5729a.
Dentistry, 1768c.
Denver, Colo., 1770a.
Denver, University of, 1771b.
Department, 1771b.
Department of—
Agriculture, 105b.
Commerce, 1512b.
Commerce and Labor, 1512b.
Interior, 3013c.
Justice, 3192d.
Labor, 3283b.
Navy, 4099a.
State, 5535a.
War, 6138c.
Department store, 1771c.
Dependent Pension Bill of 1890, 2700a.
De Pauw University, 1772b.
Depew, Chauncey Mitchell, 1772b.
Depth bombs, 5603b.
Depth of mines, 3821d.
Depth of ocean, 4332b.
De Quincey, Thomas, 1772d.
Derby (hat), 2712d.
Derby, Conn., 1773b.
Derby, England, 1773a.
Derby, Frederick Arthur Stanley, 1773c.
*De Rerum Natura*, 3531a.
Derived interjections, 3016d.
Dermal senses, 1323b.
Dermis, 5400c.
Derrick, 6265b.
Dervish, 1774a.
Desaguadero River, 5820b.
Descartes, René, 1774a, 4642a.
Descending colon, 7d, 3024b.
Descending node, 4244b.
Descending vena cava, 6045c.
*Descent from the Cross*, 4450.
*Descent of Man*, 1706a.
Deschutes River, 4403c.
Descriptive sociology, 5428a.
Deseret, 6009b.
Deseronto, Ont., 1774c.
Desert, 345a, 1774d, 4922c.
*Deserted Village*, 2529b.
Desert mirage, 3840c.
Desiderius, 1273c.
Design, 2975b.
Design for costume, 1602d.
Designs for oak booklet, 4324b.
Desirade Island, 2630a.
Desire, 6287a.
Des Moines, Ia., 1775b.
Des Moines Plan, 1513d, 1776a.
De Soto, Fernando, 1776b.
Destinn, Emmy, 1776d.
Detector in wireless telephony, 6328a.
Detroit, Mich., 1777a.
Detroit River, 1779c.
Destroying angel mushroom, 4016a.
*Destruction of Sennacherib*, 5302d.
Destructive distillation, 1809d.
Determinism, 2326c.
Dettingen, Battle of, 2520c.
Deucalion, 1779d, 4044a.
*Deuteronomic Code*, 4576b.
*Deuteronomy*, 1780a.
Deutsche, 2468b.
*Deutschland*, 915b, 5603d.
Developing (photography), 4649d.
Development of knight, 1359b.
Deviation of the compass, 1521b.
Devil, 1780b.
Devil fish, 1780c.
Devil's darning needle, 1850b.
Devil's Island, 2331a.
Devils Lake, 4270b, 4274b.
Devils Lake, N. D., 1780d.
Devil's snuff-box mushroom, 4014c.
Devil's Tower, 5465d.
Devil's trumpet, 5584b.
Devil worship, 1781a.
Devonian Period, 1781a, 2440a.
Devonshire, Victor Christian William Cavendish, 1781c.
Dew, 1782a.
Dewey, George, 1782c, 3625c.
Dewey, John, 1783a.
De Witt, Jan, 4128d.
Dew-point, 2105c, 2870c, 4921c.
Dew retting, 2206a.
Dextrin, 1587d, 1783b.
Dey, 196d.
Dharm Raja, 703a.
Dhawalaghiri, Mount, 4116a.
Dhegiha Indians, 4884c.
Dhobie itch, 3087a.
Dhole, 1827b.
Diabase, 1783c.
Diabetes, 1783c.
Diagonal scale, 1784a.
Diagram of sentence, 5304c.
Diagram of township and range, 3309d.
Dial, New form of, 1436b.
*Dial, The*, 5859c.
Dialect, 1784b.

Diameter of circle, 1385d.
Diameter of sphere, 5494d.
Diamond, 1168a, 1784d, 2688b.
Diamond-back terrapin, 5762d.
Diamond cutting, 240a.
Diamond Mountain, 4403b.
Diamond rattlesnake, 4934b.
Diamond State, 1747b.
Diana, 1787a.
Diana, Temple of, 5318b.
Diaphragm, 1787c.
Dias, Bartholomeu, 1787d.
Diastase, 916d.
Diatom, 1788a.
Diaz, Porfirio, 1788a, 3579a, 3772a.
Dice, 1788c.
Dickcissel, 1788d.
Dickens, Charles, 1789a.
Dickens, Francis, 5094c.
Dickens program, 1791c.
Dickson City, Pa., 1792c.
Dicotyledonous plants, 5291b.
Dicotyledons, 862c, 1611c, 5546a.
Dictator, 1792c.
Dictionary, 1792d.
Dictograph, 1794a.
Didactic apparatus (Montessori Method), 3927a.
Didactic poetry, 1794b.
Dido, 1794c.
Didymus, 5794a.
Die, 1794d.
Dielectric, 1795a.
Die sinking, 1795a.
Diet, 1795a.
Diet (meeting), 1795d.
Dietetics. 1795b.
Diet to increase weight, 4329d.
Diet to reduce weight, 4329b.
Diffraction, 1795d.
Diffraction screen, 1796a.
Diffusion, 1796a.
Digamma, 2122c.
Digestibility of food, 2244a.
Digestion, 1796b.
Diggers, 5361b.
Digit, 1797a, 4291c.
Digitalis, 1797a.
Dijon, France, 1797b.
Dike, 1797c, 2093b.
Dillon, John, 1797c.
Dill pickle, 4662b.
Dimeter, 3756a.
Diminuendo, 4022a.
Dimnesdale, Arthur, 5231d.
Dimity, 1797d.
Dinar, 1468a.
Dindings (Straits Settlements), 4557b, 5584a.
Dine, 4090d.
Dinero, 1468a.
*Ding, Dong Bell*, 3317a.
Dingley Tariff Act, 3571b, 5705a.
Dingo, 1797d.
Dining room decoration, 3015b.
Dinizulu, 6419d.
Dinosauria, 1798a.
Dinwiddie, Robert, 1798b.
Diocletian, 1798c, 4967a.
Diogenes, 1798d.
Diomedes, 2780b, 4461b.
Dionaea, 6055b.
Dionysian mysteries, 4040b.
Dionysius, the Elder, 1799c.
Dionysius, the Younger, 1799c.
Dionysius of Syracuse, 1694b.
Dionysus, 534c.
Dip, 1799d.
Diphtheria, 1800a.
Diphthong, 1800c.
Diplodocus, 1798b.
Diplomacy, 1800c.
Dipper (bird), 1801b.
Dipper, The, 1558a.
Dipper dredge, 1857c.
Dipping needle, 1801c.
Diptera, 1801d, 3000c.
Dip the flag, 2194d.
Direct current, 1675a, 1894b.
Director of moving pictures, 3988c.
Director of the mint, 5867d.
Directory, 1801d.
Direct primary, 4816d.
Direct radiation, 2751b.
Direct - reading hygrometer, 2893b.
Direct taxes, 5712b.
Dis, 4712a.
Disability pension, 4575a.
Disasters at sea, 5356d.
Disciples of Christ, 1801d.
Disciples' prayer, 3501d.
Discipline, 1329a.
Discipline (Montessori Method), 3925c.
Discipline in camp, 1085c.
*Discobolus, The*, 1803c.
Discordia, 2072d.
Discount, 1802c.
Discus, Throwing the, 1803c.
Disease, 1804a.
Disease, Prevention of, 96b.
Diseases of animals, 1805b.
Diseases of apple trees, 298c.
Diseases of plants, 1806a.
Diseases of sheep, 5342b.
Dishrag gourd, 2545b.
Dish towel, How to make, 5325a.
Disinfectants, 286a, 1807b.
Disk blower, 779b.
Dismal Swamp, 4266d, 6093b.
Dispersal of Jews, 3150c.
Dispersal of seeds, 5292b.
Disraeli, Benjamin, 1807c.
*Dissertation on Roast Pig*, 1566a.
Dissociation, 2896c.
Dissolution of partnership, 4519a.
Dissolving views, Stereopticon, 5549a.
Distances from Honolulu, 2720a.
Distances from Tokyo, 3120d.
Distances, in astronomy, 441c.
Distemper, 1808b.
Disthene, 3282a.
Distillation, 1808c.
Distilled liquors, 1810a.
*Distinguished Member of the Humane Society, A*, 4450.
Distinguished Service Order, 6081c.
Distributing tiles, 5323a.
Distribution of plants, 4697b.
Distribution of wealth, 6228c.
Distribution of wheat, 6263a.
District Courts (U. S.), 1614a.
District of Columbia, 1810b.
District of Columbia, Court of Appeals, 1614b.
District of Columbia, Supreme Court, 1614b.
Districts, Congressional, 4973c.
Diver, 1811c.
Divide, 1812a.
Divided bole, 5870d.
Divided spectacles, 5488a.
Divination, 1812b.
*Divine Comedy*, 1699c.
"Divine Raphael," 4930c.
Divine right of kings, 1814a.
"Divine Sarah," 698b.
Diving, 1814b.
Diving beetles, 6214c.
Diving bell, 1815a.
Diving for pearls, 4543c.
Diving rod, 5446c.
Divining-rod, 1813c.
Divisibility of numbers, 1815c.
Division (mathematics), 1817a.
Division by a fraction, 2290a.
Division in algebra, 191d.
Division of decimals, 1734b.
Division of denominate numbers, 1768a.
Division of labor, 1917d, 2325d.
Divisions of time, 2438b.
Division with reduction, 1818c.
Divodurum, 3761d.
Divorce, 1821c.
Dix, John Adams, 1629d, 1822c.
Dix, Mount, 54a.
Dixie, 1822d.
Dixie Highway, 1823a, 3448b.
Dixon, Captain, 4899b.
Dizziness, 6072b.
Djeda, Alonzo de, 5451b.
Dnieper River, 1824d.
Dniester River, 1825a.
*Do as I do* (game), 2375a.
Dobbin, James C., 4666b.
Dobrudja, 5103b.
Dock, 1825b.
Dock (plant), 1825a.
Dockstader, Lew, 3837c.
Dockyards, 1825c.
Doctor of Medicine, 3717a.
Doctrines of the Roman Catholic Church, 5051d.
Dodder, 859d, 1825d.
Dodge, Mary Elizabeth, 231d.
Dodger, 908d.
Dodgson, Charles Lutwidge, 1826a.
Dodo, 1826c.
Doe, 1739b.
Dog, 1826b.
Dogbane, 1829c.
Dog bite, 4721d.
Dog days, 1829d.
Doge, 1829d.
Doge's Palace, 1830b.
Dogfish, 1830b.
Doggett, Thomas, 5093b.
Dog grass, 1611d.
Dog of the forest, 3379c.
Dog-salmon, 936b, 5174c.
Dogs-head butterfly, facing 1022.
Dog sledge, 4919a.
Dog-star, 5395a.
Dogteeth, 5728d.
Dog-tooth spar, 3434d.
Dog-tooth violet, 1830c, 6088d.
Dog violet, 6088d.
Doherty, Charles Joseph, 1830d.
Doldrums, 1072d, 1831a.
Dole, Mount, 5659b.
Dole, Nathan Haskell, 1831a.
Dole, Sanford Ballard, 1831b, 2722b.
Dollar, 1831c.
Dollar diplomacy, 5682b.
Dolls, Paper, 1831c.
Dolly Varden trout, 5886b.
Dolomite, 1834c.
Dolomites, The, 1834d.
Dolphin, 1835a.
*Dombey and Son*, 1790b.
Dome, 1671c, 1835b, 3872d, 6041c.
Dome of the Rock, 3142d.
Domenichino, 1835d.
Domesday Book, 1836a.
Domestic art, 1836c.
Domesticated rabbits, 4907a.
Domestic breeds of sheep, 5341d.
Domestic exchange, 718c.
Domestic hygiene, 2891d.
Domestic science, 1836c, 2816a.
Domestic service, 1838c.
Dominant (music), 2691a.
Dominic, Saint, 1839c.
Dominica, 3370b.
Dominican Republic, 5201a.
Dominicans, 1839b, 3732d.
Dominion, N. S., 1839c.
Dominion coat of arms, 2777b.
Dominion day, 1839d.
Dominion Observatory, 5734d.
Dominion of Canada, 1091a.
Dominion of Canada flag, 2198a.
Dominion of New England, 252c.
Dominion Parliament building, 1116b.
Domino, 3679a.
Dominoes, 1840a.
Domitian, 1840b.
Dom Pedro II, 906c, 4548c.
Donatello, 1840c.
Donatists, 2996a.
Don Carlos, 868a.
Don Cossacks, 1599c.
Donegal rock, 3054a.
Donizetti, Gaetano, 1841a.
Donjon, 1218d.
Don Juan, 1841b.
Donkin, Sir Rufus, 4767b.

Donnelly, Ignatius, 1841c.
*Don Quixote*, 1256c, 1841d, 4302d.
Don River, 1840c.
Doom palm, 1842a, 4462b.
Doomsday Book, 1836a.
Door-mat, 3269d.
"Doorstep of a continent," 4296a.
Dorcas, 2410b.
Dore, Mont, 2296b.
Doré, Paul Gustave, 1842b.
Dorians, 1842c.
Doric column, 1507c.
Doric tunic, 5900d.
Dorion, Sir Antoine Aime, 1842c.
Doris (Greece), 318a.
Doris (mythology), 4118a.
Dormant partners, 4519a.
Dormant volcanoes, 6111d.
Dormouse, 1843a.
Dorr, Thomas Wilson, 1843c.
Dorr's Rebellion, 1843b.
Dorsal vertebrae, 5398d.
Dortmund, Germany, 1843d.
Dorus, 1842c.
Dory, 4584a.
Dot (music), 4025a.
Dotheboys Hall, 4231b.
Douai, or Douay, Bible, 1843d.
Double bass viol, 6088c.
Double-entry bookkeeping, 814b.
Double gamma, 2122c.
Double harp, 2692d.
Double possessive, 4808a.
Double rhyme, 5004d.
Double stars, 1844a.
Doublet, 1860d.
Doublet (gem), 2414a.
Doubling (cards), 924d.
Doubloon, 1468a.
"Doubting Thomas," 5794a.
"Doughfaces," 4928b.
Doughty, Arthur George, 1142d, 1844b.
Douglas, Ariz., 1844c.
Douglas, Sir James, 1844d.
Douglas, Mount, 3904c.
Douglas, Stephen Arnold, 1845b, 3439c
Douglas, William, 266b.
Douglas fir, 935a, 940d, 5512c.
Douglass, David, 2831a.
Douglass, Frederick, 1846a.
Douglas spruce, 5512c.
Doum palm, 1842a.
Douro River, 4779d, 5473b.
Douw, Gerard, 4454b.
Dove, 1846b.
Dove plant, 2815c.
Dover, Del., 1847b.
Dover, England, 1847a.
Dover, N. H., 1847d.
Dover, Strait of, 1847b.
Dover cliffs, 2038c.
Dow, Neal, 1848a.
Dowager queen, 4898d.
Dowden, Edward, 1848b.
Dowie, John Alexander, 1848c.
Downing gooseberry, 2636b.
Downing Street, London, 3489b.
Downy gentian, 2420c.
Downy mildew, 2574b, 3796b.
Downy woodpecker, 6353a.
Doyle, Sir Arthur Conan, 1848d.
Drachenfels, 4993c.
Drachma, 1849c.
Draco, 1849c.
Draco, the Dragon, 443d.
Draft, 1849d.
Draft horse, 2840c, 2841a.
Drafting, 1551c, 6174b.
Drafts of air, 3411b.
Draga, Queen, 4607d.
Drago Doctrine, 4475b.
Dragon, 1850b.
Dragon, Saint George and the, 5151b.
Dragon fly, 1850b, 3968d.
Drainage, 1850c.
Drainage basins of Central United States, 3852d.
Draisine, 712d.
Drake, E. L., 4615d.
Drake, Sir Francis, 1851b.
Drake, Friedrich, 5276c.
Drama, 1851b.
Drammen River, 4284a.
Draper, Andrew Sloan, 1856b.
Draper, John W., 4650b.
Draughts, 1290a.
Drave River, 5225b.
Dravidians, 2943a.
Drawbridge, 1218d.
Drawing, 1856c.
Dreadnaught, 4096b, 6180b.
Dreamland, 1857a.
*Dream of Fair Women, A*, 2761d.
Dreams, 1856d.
Drebbel, Cornelius van, 5603c.
Dredging, 1857a.
Dred Scott Decision, 1857c.
Drennan, William 2021d.
Dresden, Germany, 1858a.
*Dresden*, The, 6167b.
Dresden china, 1858d.
Dress, 1859a.
Dress reform, 1861c.
Drew, John, 1862b.
Drexel, Anthony Joseph, 1862d.
Drexel Institute of Art, Science and Industry, 1862c.
Dreyfus, Alfred, 1862d, 6414c.
Dried pears, 4543a.
Dried peas, 4534b.
Dried persimmon, 4597a.
Drift, 1863a.
Drift net, 4122a.
Drill, Boring, 842d.
Drill, Planting, 5470d.
Driver ants, 275d.
Dromedary, 1863b.
Dropsy, 1863c.
*Drop the Handkerchief* (game), 2376c.
Dropwort, 5500d.
Drowned valley, 6023a.
Drowning, 1863c.
Drug, 3718c.
Druggist, 1865a.
Drug habit, 3719a.
Druids, 1865b, 3865a.
Drum, 1865c.
Drum and bell towers, 4552d.
Drum armature, 1996a.
Drum cavity, 1898d.
Drumfish, 2629c.
Drummond, Sir George Gordon, 1866b.
Drummond, Henry, 1866b.
Drummond, Lake, 6093d.
Drummond, William Henry, 1866c.
Drummond Island, 3633d.
Drummond phlox, 4642d.
Drummondville, Que., 1867a.
Drums and rattles of Indians, 2967a.
Drumtochty, 6223d.
Drunkenness, 168d.
Drusus, 5805c.
Drusus Caesar, 5805d.
Dryads, 1867a.
Dry battery, 1982c.
Dryden, John, 1867b.
Dry-dock, 1825c.
Dry farming, 1868b.
Drying oils, 4357c.
Dry measure, Table of, 1765b.
Dry monsoons, 3902c.
Dry pleurisy, 4707c.
Dry process in assaying, 428b.
Dry-salting of ham, 2672d.
Dry steam, 5538d.
Dry Tortugas, 1870b.
Dry yeast, 6386b.
Dual purpose type cattle, 1234d.
Du Barry, Marie Jeanne Becu, 1870c.
Dubhe, 443c.
Dublin, Ireland, 1870d.
Dublin University, 1871b.
Dubois, Pa., 1871b.
Dubuque, Ia., 1871c.
Ducat, 1872c.
Duchamp, Marcel, 1667b.
Duchess, 1876c.
Duchess apple, 297b.
*Duchess of Devonshire*, 4451.
Duck, 1872b.
Duck (cloth), 1164c.
Duck-billed platypus, 1874a.
Duck-coys, 1737d.
Duck hawk, 2130d.
Duck Mountain Forest Reserve, 3628b.
Ductility, 1874c.
Dudevant, Armantine Lucile Aurore Dupin, 5186c.
Dudley, Lord Guilford, 2625a.
Duel, 1874c.
Duff, Lyman Poore, 1875a.
Dufferin and Ava, Frederick Temple Blackwood, 1875a.
Duffield, George, 2896a.
Dufour Spitze, 3914a.
Dugong, 1875d.
Dugout canoe, 1159d.
Duisburg, Germany, 1876a.
Duke, 1876b, 4550b.
Dukhobors, 1876c, 5216a.
Dulcigno, Montenegro, 3913b.
Dulcimer, 1876d.
Duluth, Minn., 1877a.
Duma, 1878a, 5120d.
Dumas, Alexandre, the Elder, 1878d.
Dumas, Alexandre, the Younger, 1879c.
Du Maurier, George Louis Palmella Busson, 1879c.
Dumb-bells, 1879d.
Dum-dum bullets, 237d, 993d.
Dum palm, 1842a.
Dunbar, Battle of, 5262a
Dunbar, Paul Laurence, 1880a.
Duncan, Norman, 1143b, 1880b.
Duncan, Sara, 1603a.
Dun Commercial Agency, 1512d.
Dundas, Ont., 1880c.
Dundee, Scotland, 1880d.
Dundhu Panth, 4058b.
Dune, 1881b.
Dunedin, N. Z., 1881d.
Dunfermline, Scotland, 1882a.
Dunkards, 1882b.
Dunkers, 1882b.
Dunkirk, France, 1882c.
Dunkirk, N. Y., 1882d.
Dunkirque, France, 1882c.
Dunmore, Pa., 1883a.
Dunmore Lake, 6063d.
Dunne, Finley Peter, 1883a.
Dunnville, Ont., 1883b.
Dunsmuir, James, 1883c.
Duns Scotus, Joannes, 1883c.
Dunstan, Saint, 1883d.
Dunvegan, Alta., 1884a.
Duodenum, 7c, 201a, 1796d.
Duplex telegraph system, 5735b.
Duquesne, Pa., 1884a.
Durability of stone, 988c.
Dura mater, 891c, 3727c.
Duran, Ecuador, 2634c.
Durang, Ferdinand, 5533b.
Durango, Mexico, 1884b.
Durant, Henry Fowle, 1884b, 6243b.
Duration of tones, 4022b.
Durazzo, Albania, 147b.
Durban, Natal, 1884b.
Durbar, 1884c.
Dürer, Albrecht, 1884c.
Durfee Hill, 4996d.
Durham, John George Lambton, 1885a.
Durham, N. C., 1886a.
Durham cattle, 1237a.
D'urville, Dumond, 4728c.
Duse, Eleanora, 1886c.
Dusky grouse, 2629a.
Düsseldorf, Germany, 1886c.
Dust, Atmospheric, 1886d.
Dustan, Hannah, 2716c.
Dutch cheese, 4124b.
Dutch clover, 1440a.
Dutch Guiana, 1889a.
Dutch language, 4123a.

Dutch literature, 4123b.
Dutch Magna Charta, 4128b.
Dutchman's breeches, 1890a, 4760b.
Dutch national hymn, 2893d.
Dutch New Guinea, 4154c.
Dutch rabbit, 4907a.
Dutch Reformed Church, 4961d.
Dutch ure, 3796c.
Dutch windmill, 4125a, 6311c.
Duties, 1677b.
Dvalin, 5796c.
Dvorak, Antonin, 1890c.
Dwarf, 1890d.
Dwarf palm, 4462b.
Dwarf palmetto, 4464c.
Dwarf pear, 4542c.
Dwarf pine, 4678a.
Dwarf sumac, 5622a.
Dwarf tree, 5870a.
Dwarf trillium, 5879d.
Dwight, Theodore, 2706b.
Dwight, Timothy (1752-1817), 1891a, 6380d.
Dwight, Timothy (1828-1891b.
Dyaks, 1891c.
"Dyed in the wool," 6354d.
Dyeing and dyestuffs, 1892a
Dyer's madder, 3578c.
Dyer's woad, 6343b.
Dykes, John B., 2896b.
Dynamics, 1892d, 3714d.
Dynamite, 1893b, 2115b.
Dynamo, 1893c.
Dynamo, in telegraphy, 5735c.
Dyne, 1895b.
Dyspepsia, 1895c.
Dysprosium, 1294c.

# E

E, 1896a.
Eadbald, 4312b.
Eads, James Buchanan, 1896b, 5161b.
Eads Bridge, 1896d.
Eagle (bird), 1897a.
Eagle (coin), 1898b.
Eagle (as a standard), 1897d.
Eames, Emma, 1898b.
Ear, 1898c, 5303a.
Eared pheasant, 4619b.
Eared seals, 5280d.
Ear-flower (color plate), facing 2224.
Earl, 4550a.
Earl, 1901a, 4550a.
Earl of Stanhope, Charles, 4825b.
Early, Jubal Anderson, 1901c.
Earrings, 5020d.
Earth, 1901b, 2422b.
Earth currents, 1905a.
Earthenware, 4798a.
Earthpig, 1b.
Earthquake, 1905b, 3084d.
"Earthquake council," 6367a.
Earthwolf, 1d.
Earthworm, 1906c, 5431b
Earwig, 1907b.
Easement, 1907c.
East Cambridge, 1076d.
East Chicago, Ind., 1907d.
Easter, 1908a, 2158a.
Easter Island, 1335d.
Easter lily, 1909a.
Eastern Church, 2610a.
Eastern hemisphere, 2766b.
Eastern pickerel, 4661b.
Eastern question, 553a, 1557d, 3558c, 5912d.
Eastern Republic of Uruguay, 6006a.
Eastern Shore, 6093a.
Eastern Star, Order of, 2318d.
Eastern time, 5524b.
Eastern yew, 6393c.
Easter program, 1908c.
Easthampton, Mass., 1909c.
East India Company, 1909d.
East Indian coffee, 1464c.
East Indies, 1910b.
East Indies, Dutch, 1910b.
*Eastland*, The, 5357a.
East Liverpool, O., 1910c.
Eastman Locks, 3748c.
Easton, Pa., 1911a.
East Orange, N. J., 1911c.
East Providence, R. I., 1911d.
East River, 1911d.
East Room, 6274a.
East Saint Louis, Ill., 1912a.
East Tierra del Fuego, 5809b.
Eating, 2207d, 3412c, 3693b.
Eaton, Sir John Craig, 1912c.
Eaton, Theophilus, 4161a.
Eau Claire, Wis., 1912d.
Eau de Cologne, 1475c.
Eaves, 1196a.
Ebb tide, 5808b.
Ebers, Georg Moritz, 1913b.
Ebony, 1913b.
Ebro River, 5473c.
*Ecclesiastes*, 1913c.
Ecclesiastical calendar, 1052b.
Echelon formation, 5678a.
Echidna, 1913d.
Echinoderms, 1913d.
Echinus, 1507d.
Echo, 1914b.
Echo Canyon, 6015c.
Echo River, Mammoth Cave, 3227b.
Eck, Johann Maier von, 1914d.
Eclectic School (painting), 1200a.
Eclectic School of Philosophy, 4641d.
Eclipse, 1915a.
Ecliptic, 1916a.
*Eclogues*, 6061c.
Ecole des Beaux Arts, 1916c.
Ecology, 861a, 1916c.
Economic botany, 862d.
Economic geography, 2429a.
Economic map of—
Africa, facing 80.
Asia, facing 416.
Europe, facing 2096.
North America, facing 4256.
South America, facing 5448.
Economics, 1917a.
Ecuador, 1919b.
Eczema, 1922b.
Edam cheese, 1291c.
Edda, 1922c.
Eddy, Clarence, 1922c.
Eddy, Mary Baker, 1368b, 1922d.
Eddystone Lighthouse, 3427a.
Edelweiss, 1923c.
Eden, Garden of, 1924a, 5908d.
Edentata, 1924a.
Edfu, Temple of, 323c.
Edge Island, 5503b.
Edible bamboo, 1068d.
Edible birds' nest, 1924b.
Edible mushrooms, 4014b.
Edict of Nantes, 4060a.
Edict of Restitution, 5792a.
Edinburgh, Scotland, 1924c.
Edinburgh, University of, 1925a.
Edison, Thomas Alva, 1925b, 3027a.
Edison-Lalande cell, 1982c.
Edison storage battery, 5562a.
Edisto River, 5457b, 5462c.
Edith, Mount, 5046a.
Editorial writers, 4185b.
Edmonton, Alta., 1927a.
Edmunds, George Franklin, 1928b.
Edmunds Anti-Polygamy Act, 394b.
Edmundston, N. B., 1928c.
Edmunds-Tucker Act, 5990a.
Edom, 1928d, 4955d.
Edomites, 2074d.
Education, 1929a.
Compulsory education, 1948a.
Educational museums, 1950a.
Education for the home, 1953a.
Hygiene of education, 1944a.
Measuring results of education, 1933b.
Modern tendencies in education, 1938a.
National Education Association, 1952a.
Natural education, 1929b.
United States Bureau of Education, 1953b, 4964d.
Education, Commercial, 1955d.
Education, Household arts in, 2850a.
Education, Rural, 99c.
Educational psychology, 4861b.
Education in Canada, 1113a.
Education of the blind, 770b.
Education of the deaf and dumb, 1718c.
Education of the feeble-minded, 2149a.
Education of the senses (Montessori Method), 3919a.
Edward (England), I, II, III, IV, V, VI, VII, 1956a-1958d.
Edward, the Black Prince, 1958b.
Edward the Confessor, 1958c.
Edwards, Harry Stillwell, 1958d.
Edwards, Jonathan, 1958d.
Edwardsville, Pa., 1959a.
Edwin natural bridge, 4077d, 6013a.
Eel, 1959b.
Eerste Kamer, 4126a.
Effective horse power, 2843b.
Effects of tobacco, 5825d.
Effects of wind, 6310c.
Effect used for cause, 3757d.
Effort, Value of, 6288c.
Egbert, 1959d.
Egeria, 1959d.
Egg, 1960a.
Egg breeds (poultry), 4800a.
Egg-layer's balanced ration, 4802b.
Eggleston, Edward, 1963a.
Eggplant, 1963c.
Eggs of—
Fly, 2231d.
Mosquito, 3966b.
Oyster, 4439b.
Egina Island, 71a.
Eglantine, 1963d, 2827b.
Egret, 1964a.
Egypt, 1965a.
Egyptian cat, 6283c.
Egyptian cotton, 1604c, 5961c.
Egyptian dress, 1859b.
Egyptian papyrus, 4482c.
Egyptian rite, 3466d.
Egyptian sculpture, 5273a.
Egyptian sphinx, 5495d.
Egyptian war galley, 6183a.
Eider-down, 1973b.
Eider duck, 1973a.
Eiffel, Alexandre Gustave, 1973d.
Eiffel Tower, 1973b.
Eighteenth Amendment (proposed), 4834d.
Eighteenth century dress, 1859a.
Eight Brothers, 525a.
Eight-hour day, 1973d.
Eight-real pieces, 4660c.
"Eight views of Omi," 3118d.
*Ein' Feste Burg*, 3540b.
Ekaterina, Lapland, 1974b, 2640a.
Elektron, 222c.
Edron, 4638d.
Elaborated sap, 5203c.
Eland, 278c, 1974d.
Elastic gum, 2971d.
Elasticity, 1975a.
Elastic tissue, 5818c.
Elba, Island of, 1975a.
Elbe River, 1975b.
Elbe and Trave Canal, 1147b.
Elberfeld, Germany, 1975d.
Elbert, Mount, 1486a.
Elberta peach, 4538d.
Elburz Mountains, 1975d.
El Caney, Battle of, 1976a.
El Capitan, 5045a, 6397b.

Elder, 1976a.
Elderberries, 1976c.
El Dorado, 1976d, 2525a.
Elecampane, 1977a.
Election, 1977a.
Election, Doctrine of, 4806d.
Election of Pope, 4756a.
Election of President, 4811c.
Election to House of Representatives, 4974a.
Elective studies, 1978a.
Electoral College, 1978c.
Electoral Commission, 1979d.
Electoral Count Act, 1420c.
Electors, German Imperial, 1978c.
Electors, of the President and Vice-president, 1979a.
Electra, 1980b, 4707a.
Electrical attraction, 469d.
Electrical energy, 5562a.
Electrical fish, 1980b.
Electrical therapeutics, 5785b.
Electric arc, 1992a.
Electric automobiles, 517d.
Electric battery, 1980c.
Electric bell,1983a.
Electric cars, 1998b.
Electric clocks, 1436c.
Electric furnace, 2353c.
Electric heating, 1983c, 2752c.
Electric induction, 2973a.
Electricity, 1983b, 3397c, 3428a.
Electric light, 1989b.
Electric locomotive, 1997d, 3479b, 4919d.
Electric machine, 1992d.
Electric meter, 1994a.
Electric motor, 1994d.
Electric oscillation, 6326a.
Electric Peak, 6388c.
Electric pen, 4557a.
Electric railway, 1997b.
Electric ray, 5843b.
Electric shock, 1987d.
Electric waves, 6324d.
Electric welding, 1998d.
Electrochemistry, 1999b.
Electro-contact mines, 5605a.
Electrocution, 1173c, 1999d.
Electrode, 2000a.
Electrolysis, 2000a, 3751b.
Electrolyte, 2000b.
Electrolytic detector, 6322a.
Electrolytic interrupter, 6323d.
Electromagnet, 2000d.
Electromagnetic theory of light, 2001b.
Electromagnetism, 2001d.
Electrometer, 2002c.
Electromotive force, 1674d, 2002d.
Electron theory, 1295c, 1985d.
Electroplating, 2003c.
Electroscope, 2003d.
Electrotyping, 2004b.
Elegy, 2004d.
*Elegy Written in a Country Churchyard*, 2004d, 2581b.
Element, 1294b, 3878a.
Elementary education, 1941d.
Elementary electric charge, 1986a.
Elements, Chemical, 1294b.
Elephant, 2005b.
Elephant Butte Dam, 2018a, 3065b.
Elephant ears, 1475a.
Elephantiasis, 2007b, 3968a.
Elephant Island, 4730a.
Elephant mound, 6336c.
Elephant seal, 5283b.
Eleusinian mysteries, 4040b.
Elevations on the moon and earth compared, 3941b.
El Fasher, 1703b.
Elgin, Ill., 2007b.
Elgin, James Bruce, Eighth Earl of, 2008a.
Elgin Marbles, 2009a.
Eli, 2009c.
Elijah, 2009c, 4935a.
Eliot, Charles William, 2009c, 2709d.
Eliot, George, 2010c, 3394a.
Eliot, John, 2011d.
Eliot, William Greenleaf, 6210b.
Eliphaz, 3154b.
Elis, 318a.
Elisha, 2012a.
Elixir, 2012a.
Elizabeth (Austria), 2310c.
Elizabeth (Bavaria), 152d.
Elizabeth (England), 795a, 2012a.
Elizabeth, N. J., 2013b.
Elizabethan Age, 90c, 2056a.
Elizabethan costumes, 1861b.
Elizabeth City, N. C., 2013c.
Elk, 2013d.
El-Khalil, 2756d.
Elkhart, Ind., 2014c.
Elk Island Park, 4506a.
Elks, Benevolent and Protective Order of, 2014d.
Ellesmere Land, 2014d.
Elliott, Charlotte, 2895c.
Elliott, Maxine, 2015a.
Ellipse, 2015b.
Ellipsographs, 2015c.
Elliptical leaf, 3361a.
Ellis Island, 2015c.
Ellsworth, Oliver, 2015d, 5630d.
Ellsworth Zouaves, 6419c.
Elm, 2016b.
Elmira, N. Y., 2017b.
Elm-leaf beetle, 2017a.
Elm-leaved sumac, 5622b.
El-Miskiyeh, 3364a.
Elobey Island, 5476b.
Elohim, 3136d.
Elongation (astronomy), 1538a.
El Paso, Tex., 2017c.
Elsinore Island, 1762b.
Elwood, Ind., 2018d.
Elyria, O., 2018d.
Elysian Fields, 2019a, 3386d.
Emancipation, Roman Catholic, 2591c.
Emancipation Proclamation, 2019b, 3442d.
Embalming, 2019c.
Embargo, 2020a.
Embargo Act, 2020b, 6140d.
Embezzlement, 2020c.
Embossing, 2020c.
Embrasures, 1218d.
Embroidery, 2020d.
Embryo, 2021c, 2482d.
*Emden*, The, 6167b.
Emerald, 2021c.
Emerald Isle, 2021d.
Emerald Spring, 6390b.
Emerson, Ralph Waldo, 2021d.
Emery, 2023b.
Emetic russula mushroom, 4016b.
Emetine, 3043b.
Emigration and Immigration, 2023c.
Émigrés, 2025c.
Eminent domain, 2026a, 4916a.
Emin Pasha, 2026c.
Emma of Normandy, 2688a.
Emmet, Robert, 2026c.
Emmett, Daniel, 1823a.
Emmons Peak, 5935d.
Emotional shock, 4859d.
Emotions, 2149d.
Emperor, 2026d.
Empire, 2026d.
Empire Builder of Great Britain, 4685b.
Empire day, 2027a.
Empire movement, 2027a.
Empire State, 4193a.
Empire State (tree), 5309c.
Empire State of the South, 2453a.
Employers' liability, 2027b.
Emporia, Kan., 2029a.
*Empress of Ireland*, The, 5356d.
Ems, Germany, 2029b.
Emu, 2029c.
Emulation, 223c.
Emulsion, 2029d.
Ena, Princess, 182d.
Enabling Act, 2029d.
Enamel, 2030a.
Enamel of teeth, 5729a.
En cabochon, 3330c.
Encaustic tiles, 5812d.
Encyclopedia, 2030b.
*Encyclopedia Britannica*, 2031a.
Enderby Land, 4728b.
Endicott, John, 2030b.
Endicott Range, 137a.
Endive, 2031c.
Endless belt, 683a.
Endless chain, 773d.
Endless screw, 5271a.
Endocarditis, 2747b.
*End of the Trail*, 3448c.
Endolymph, 1900a.
Endorsement, 1289a, 4111c.
Endowment policy, 3005d.
*Endurance*, The, 4729d.
Endymion, 2031c, 3217d.
Enemies of rice, 5007a.
Enemies of wheat, 6263d.
Enemy, 2031c.
Energy, 2032a.
Energy and climate, 1430a.
Enfleurage, 2117a.
Enforcement of treaties, 5868d
Engelmann spruce, 5512c.
Engine, 2033a, 2403a, 5538d.
Engineering, 2033b.
Engine plow, 4709a.
England, 2035a, 2582b.
"England expects every man will do his duty," 4114a.
Englewood, N. J., 2050b.
English, Corrupted, 4663c.
English and metric measurements compared, 3760a.
English Cabinet officers, 3823c.
English Channel, 2050c.
English coins, Rare, 4312a.
English crowns, 1649c.
English Derby, 4909a.
English freight cars, 4917d.
English History, Father of, 2141d.
English ivy, 3090b.
English Justinian, 1956a.
English language, 2051a.
English literature, 2053a.
English mile, 3796c.
English penny, 4574a.
English Poetry, Father of, 2141d.
English Pottery, Father of, 2141d.
English Printing, Father of, 2141d.
English Prose, Father of, 2141d.
English ragwort, 4914d.
English ring neck pheasant, 4619d.
English River, 6317a.
English Royal Yacht Squadron cup, 6379a.
English sculpture, 5276c.
English setter, 5317b.
English sparrow, 5482a.
English tariff, 5703a.
English type, 5930d.
English types of buildings, 2039b.
English walnut, 6131a.
Engraving, 2057d.
Enid, Okla., 2059a.
En Nasira, Asia Minor, 4099c.
Ensign, 2059b.
Ensilage, 5384b.
Entablature, 324a, 1507d.
Entebbe, Uganda, 5935a.
Entomology, 106c, 2059c.
Entozoa, 6360a.
Envelope, 2059c.
Environment, 1638c, 2060a.
Environment, Relation of senses to, 3921d.
Enzyme, 4477a.
Eocene Period, 2061b, 2439a.
Epaminondas, 2061c.
Epaphus, 3030c.
Ephemerida, 3000d.

The letters a, b, c, d, following page numbers indicate first, second, third or fourth quarters of page.

Ephesus, 2061c.
Ephialtes, 3383a, 5787d.
Ephraim, 3175a.
Ephyra, Greece, 1580a.
Epic, 2061d.
Epic poetry, Father of, 2141d.
Epictetus, 2062b.
Epicurean School of Philosophy, 4641d.
Epicurus and Epicureanism, 2062c.
Epidemic, 2063a.
Epidermis, 5400b.
Epigram, 2063c.
Epilepsy, 1947d, 2064a.
Epimetheus, 4043b, 4477b, 4836c.
Epiphany, 2064c
Epiphytes, 121b.
Epirus, 2064d.
Episcopal Church, 2064d.
Epistle, 3387a.
Epistles of Paul, 4530a.
Epistles of the Bible, 3387a.
*Epistle to the Corinthians,* 1581b.
Epitaph, 2065a.
Epithelial tissue, 5818b.
*E Pluribus Unum,* 1898a, 2066a.
Epoch, 2066a.
Epsom salts, 2066c.
Epworth League, 1347b, 2066c.
Equality State, 6367b.
Equator, 2066d.
Equatorial calms, 1072d.
Equatorial current, 4334c.
Equestrian Order, 2067b.
Equiangular polygon, 4745c.
Equilateral polygon, 4745c.
Equilateral triangle, 5876a.
Equilibrium, Law of, 3393b, 5536c. 6265a.
Equinoctial, 2067c.
Equinox, 2067b.
Equinox, Mount, 5677b.
Equinoxes, Precession of the, 4806c.
Equisetum, 2844a.
Equity, 2067c.
Equivalent values, Table of, 1763b.
Era, 1371d, 2066a, 2438b.
Era of good feeling, 3896b.
Erasmus, Desiderius, 2068a, 4958d.
Erato, 4012b.
Eratosthenes, 1902b, 2423b.
Erbil, 432d.
Erbium, 1294d.
Ereb, 2093a.
Erebus, 2068c.
Erebus, Mount, 277a, 4729a.
Erebus Island, 5329c.
Erechtheum, 454a, 2068c.
Erfurt, Germany, 2068d.
Ergot, 2069b.
Erickson engine, 120c.
Ericson, Leif, 2069d.
Ericsson, John, 2069b, 3890b.
Eric the Red, 2069c.
Erie, Lake, 2596c.
Erie, Pa., 2070d.
Erie Canal, 2071c.
Erie Canal, First lock, 1146a.
Erigeron, 2207a.
Eris, 2072d.
Eritrea, 84b.
Ermine, 2073a.
Eros, 1671b.
Erosion, 2073c.
Erratic blocks, 867b.
Errors in use of adverbs, 66a.
Eruptions of volcanoes, 6111a.
Erysipelas, 2074c.
Erythea, Island of, 2780c.
Erytheia, 2788a.
Erzgebirge Mountains, 2469b.
Esarhaddon, 433d.
Esau, 2074c.
Escanaba, Mich., 2074d.
Escapement, 1435d.
Eschenbach, Wolfram von, 3826d, 4515b.
Escobar, Maria de, 4603b.
Escorial, 2075a.
Escudo, 1468b.
Escutcheon, 1218d, 2776c.
Esdraelon, Plain of, 4458d.
Eskimo, 2075b, 4964d.
Eskimo dog, 2078a.
Española, 1502a.
Esparto, 2078c, 2576b, 3325d.
Esperanto, 2078d.
Esprit-de-corps, 379b.
Esquiline Hill, 5064a.
Esquimalt, B. C., 2079b.
Essad Pasha, 147a.
Essay, 2079b.
Essays, Outlines for, on—
Baseball, 608a.
Cat, The, 1221c.
Dog, The, 1829a.
*Essays of Elia,* 3304a.
Essen, Prussia, 2080b.
Essences, 4357d.
Estados Unidod de Colombia, 1480a.
Estate, 2080c.
Estavayer, Switzerland, 4130c.
Estes Park, 1493b.
Estevan, Sask., 2080d.
Esther, 2081a.
*Esther, Book of,* 2081b.
Estherville-Minim Creek Canal, 1147a.
Esthetics, 2081b.
Esthonia, 2081c.
Estivation, 2791a.
Estuary, 5025c.
Etching, 2058d, 2081c.
"Eternal City," 5056b.
Ethelred II, 2082a.
Ethelwulf, 2082b.
Ether, 2082b, 3422b.
Ether (medicine), 3720b, 3960b.
Etherow River, 3748c.
Ethics, 2083a.
Ethiopia, 14b, 252b, 2084a.
Ethmoid bone, 2738d.
Ethnography, 2084b.
Ethnology, 2084c.
Etiolation, 2084d.
Etioles, Lenormant d', 4748c.
Etiquette, 2085a.
Etna, Mount, 2085c.
Etolia, Greece, 1579d.
Eton College, 2086a.
Etruria, 2086a.
Etruscan art, 2086c.
Etruscans, 2086b.
Etruscan tunic, 5900d.
Etsch River, 53d.
Etymology, 2086d.
Etzel, 4226c.
Euboea, 318a, 2087d.
Eucalyptus, 2088a.
Eucharist, 2089a.
Euchre, 2088c.
Euclid, of Alexandria, 2089a.
Eudoxia, 2419d.
Eugene, Francois, 2089c.
Eugene, Ore., 2089b.
Eugenic law of Wisconsin, 6336b.
Eugenic marriages, 3660a.
Eugenics, 2089d.
Eugenie-Marie de Montijo, 2091a.
Eugenius IV, 4528c.
Eulenspiegel, Till, 2091a.
Euphemе, 5141c.
Euphorbiaceae, 5512c.
Euphrates, 2091b.
Euphrosyne, 2548d.
Euplexoptera, 3000d.
Eurasia, 2092d.
Eureka, Cal., 2091c.
Eureka Springs, Ark., 2091d.
Euripides, 2092a, 3715d.
Europa, 2092c.
Europe, 2092b.
Europe, Flags of (color plate), facing 2197.
European crane, 1623c.
European drama, 1854a.
Europe and United States compared, 5947d.
European elk, 2014b.
European goldfinch, 2528c.
European illiteracy, 2932b.
European parcel post, 4491d.
European plan hotel, 2848a.
European snipe, 5421a.
European universities, 6001c.
European water power, 6219d.
European widgeon, 6278b.
European woodcock, 6351c.
Europium, 1294d.
Eurotas, 5482d.
Eurotas River, 3292b.
Euryale, 3723a.
Eurybiades, 5783c.
Eurydice, 2102a.
Eurynome, 2548d.
Eurystheus, 2780a.
Eurytion, 2780c.
Eustachian tubes, 1718b, 1899a.
Eustachio, Bartolommeo, 2102b.
Eutaw Springs, Battle of, 4989c.
Euterpe, 2102b, 4012b.
Evangelical Alliance, 2102a.
Evangelical Association, 2102c.
Evangelical Union, 5791b.
Evangeline, 2102d.
*Evangeline,* 19a, 2561d, 4301a, 5324a.
*Evangeline,* a plan for study, 2103a.
Evans, Sir Arthur, 3288d, 3836c.
Evans, Mary Ann, 2010c.
Evans, Robley Dunglison, 2104b.
Evanston, Ill., 2104c.
Evansville, Ind., 2105a.
Evaporated milk, 3804d.
Evaporation, 2105c, 4921b.
Evarts, William Maxwell, 2106a, 3902a.
Eve, 27b.
Evening primrose, 4817c.
Evening schools, 5240c.
Evening star, 2106a.
Everest, Sir George, 2106c.
Everest, Mount, 2106b.
Everett, Edward, 2106c.
Everett, Mass., 2107a.
Everett, Wash., 2107a.
Everglades, 2107c.
Everglade State, 2213b.
Evergreen, 2108a.
Evergreen candytuft, 1154c.
"Evergreen City," 778a.
Evergreen State, 6186a.
Everlasting flower, 2108b.
Everyday superstitions, 5633c.
Evidence, 2108b.
"Evil eye," 5634b, 6339c.
Evil spirits, Driving out, 5635b.
Evolution, 2108d.
Evolution (mathematics), 2110a.
Evolution of man, 3617d.
Evolution of plants, 4698b.
Ewald, Johannes, 1758d.
Excalibur, 2917d.
*Ex cathedra,* 4756a.
Excavations in ancient lands, 2110b.
Exchange (banking), 1289d, 2111d.
Exchange (economics), 6228c.
Exchange, Bill of, 718b.
Exchange, The, Copenhagen, 1759a.
Exchequer, Chancellor of the, 2112a.
Exchequer Court of Canada, 1118d.
Exclamation point, Use of, 4871a.
Exclamatory sentence, 5303d.
Excretions, 5289a.
Executive, 2112b.
Executive Mansion, 6273d.
Executor, 2112c.
Exercise habits, 2742b.
Exercises in physical culture, 4656a.
Exercises in writing, 4561a.
Exergue, 4311c.
Exeter, England, 2112d.
Exile, 2113a.
*Exodus,* 2113b.

Exorcism, 5635d.
Exotic, 2113c.
Expansion, 2113c.
Expansive classification of libraries, 3404a.
Expectation, 2114a.
Experimental pedagogy, 4547c.
Experiment farms, Canadian, 105b.
Experiments with oxygen, 4437b.
Expiration, 3537b.
Explanatory myths, 4041c, 4044d.
Exploitation theory of interest, 3011d.
Exploits River, 4151d.
Exploration, 2114b, 4725b.
Explosive method of quarrying, 4885c.
Explosives, 2114b.
Exponent, 5514b.
Exposition, Industrial, 2115b.
Exposition and Protest of 1828, 4309b.
*Ex post facto* law, 2116a.
Exposure (photography), 4649b.
Express company, 2116a.
Express contract, 1563c.
Express mail delivery, 4792c.
Extension, 2116c.
Extensors, 373a.
External ear, 1898c.
External parasites, 4490a.
External revolution, 4983a.
Exterritoriality, 1801b, 2116c.
Extinct crater, 6110c.
Extinct volcanoes, 6111d.
Extract of beef, 658c.
Extracts, 2117a.
Extradition, 2117a.
Extrados, 318c.
Extrajudicial oath, 4326a.
Extraordinary session of Congress, 1538c.
Extravagance, 2819d.
Extreme unction, 5052b, 5938a.
Eyck, Van (family), 2117c.
Eye, 2117d.
Eye, Accidents to, 770c.
Eye defects of children, 1946d.
Eye diseases, 769a.
Eyeglasses, 5488a.
Eye of a potato, 4793d.
Eye of a submarine, 4586d.
Eye splice, 5504a.
Eye strain, 2120c, 2739d.
Eyetooth, 5728c.
Eyre, Lake, 485c.
Ezekiel, 2121c.
Ezra, 2121c.
*Ezra, Book of,* 2121d.

# F

F, 2122a.
Fabius, 2122a.
Fable, 2122b.
Fabre, Henri, 3985b.
Fabrics, Linen, 3450c.
Facade, 2123b.
Face, The, 2123b.
Facet, 1785a, 3330d.
Factoring, 2123d.
Factory and factory system, 1326a, 2125a.
*Faerie Queene,* The, 5494b.
Fahlberg, Constantin, 5136a.
Fahrenheit, Gabriel Daniel, 2126c.
Fahrenheit scale, 1252c, 5787a.
Faïence, 2126d, 3609b.
Fainting, 2126d.
Fair, 2127a.
Fairbanks, Alaska, 2127b.
Fairbanks, Charles Warren, 2127c.
Fairbanks, Richard, 4790c.
Fairfax, Thomas, Lord, 4070a, 6200d.
Fairfield Canal, 1147a.
Fairies, 2128a.
"Fair Maid of February," 5422d.
Fairmont, W. Va., 2129c.
Fairmount Park, Philadelphia, 4624a.
Fair Oaks, Battle of, 2129d.
Fairweather, Mount, 136b.
Fairy dwarfs, 2517d.
Fairy-ring mushroom, 4014a, 4014d.
Faith cure, 2130a.
Faithful, Father of the, 2142a.
Fakir, 2130c.
Falcon, 2130d.
Falconbridge, Sir [William] Glenholme, 2131b.
Falconer, Robert Alexander, 2131b.
Falconio, Diomede, 2131c.
Falconry, 2131a.
Falkland Islands, 2131d.
Fallacy, 2132a.
Fallen Timbers, Battle of, 4354c, 5981d.
Fallières, Clément Armand, 2132b.
Falling bodies, 2132c.
Falling sickness, 2064a.
Falling stars, 441a.
Fall line, 2134a.
Fall of the leaf, 3363c.
Fall River, Mass., 2134b.
Falls of Saint Anthony, 3826a.
Falls of the Yellowstone, 6391b.
False coltsfoot, 1497a.
False croup, 1647d.
False faces, 3679b.
False imprisonment, 2134d.
False vocal cords, 3337a.
Fame, Hall of, 2670b.
Family (biology), 1410b, 2135a.
Famine, 2135a.
Famous sieges, 5475c.
Fandango, 2135b.
Fan blower, 779b.
Faneuil Hall, 846b.
Fanfaron, 3700c.
Fanny Kemble, 3220c.
Fan palm, 4461d.
Fan tracery, 5853c.
Farad, 2135b.
Faraday, Michael, 2135c.
Farce, 1509a, 2135d.
Farcy, 2505c.
Farewell Address of Washington, 6206d.
Fargo, N. D., 2136a.
Fargus, Frederick John, 2136c.
Faribault, Minn., 2136c.
Farley, John Murphy, 2136d.
Farm accounting, 21d, 826b.
Farm credits, 5108c.
Farmers' Alliance, 2563c, 4762a.
Farmers' Institute, 2137b.
Farm loan, How to secure a, 5109d.
Farm manure, 3638d.
Farm wealth in the United States, 5956d.
Farnese (family), 2137d.
Farnese Bull, 2138a.
Farnese Hercules, 2779d.
Farnham, Que., 2138a.
Faroe Islands, 2138b.
Farragut, David Glasgow, 2138c, 4767d.
Farrar, Geraldine, 2139a.
Farrell, Pa., 2139b.
Fars, Persia, 4515a.
Farther India, 2972d.
Farther-Rhine, 4994a.
Farthing, 2139b, 4574a.
Far West, Mo., 3951c.
Fasces, 2139c.
Fasciled roots, 5078c.
Fashion, 2139c.
Fashoda, 3274b.
Fasting, 2140a.
Fasts, 2140b.
Fat, 2140c, 2243b, 3413a, 4329a.
Fatalism, 2141a.
Fata morgana, 3840d.
Fates, 2141b.
Father, 2141c.
Father Jahn, 3104c.
Father of—
America, 2141d.
American poets, 965b.
Angling, 2141d.
Circulating library, The, 3403a.
Comedy, 2141d.
Constitution, The, 3579b.
Detective story, The, 1474d.
English history, 2141d.
English poetry, 1286a, 2141d.
English pottery, 2141d.
English printing, 2141d.
English prose, 2053c, 2141d.
Epic poetry, 2141d.
Faithful, the, 2142a.
Fatherland, the, 4607b.
German criticism, 3386a.
Greek tragedy, 2141d.
His Country, 2141d.
History, 2142a, 4645b.
Lies, 2142a.
Medicine, 2142a.
Modern botany, 3451b.
New France, 1120b, 1266a.
Father Tiber, 5805b.
Fathom, 2142a.
Fatigue, 1325b, 2142a.
Fat-tailed sheep, 5341b.
Fatty degeneration, 2746d.
Fault, 2142d.
Fauna, 2143a.
*Faun of Praxiteles,* 2143b.
Fauns, 2143b.
Faure, Félix, 2305c.
*Faust,* Goethe's, 2521c.
Faust or Fust, Johann, 2143d, 2644c.
Faustulus, 5066b.
Faustus, Dr., 3739d.
Fawkes, Guy, 2144a, 2641c.
Fawn, 1739b.
Fayette, N. Y., 3951b.
Fayum, Egypt, 279c.
F clef, 4022d.
Fear, Cape, 2144a.
Feast of Weeks, 4576b.
Feasts, 2157d.
Feather palm, 4461d.
Feathers, 2144a.
Feathers of birds, 730b.
Feather-veined leaves, 6046d.
February, 2145a.
Federal Board of Vocational Education, 5242c.
Federal Farm Loan Board, 5108c.
Federal Hall, 2145c.
*Federalist, The,* 2148a.
Federalist party, 2148b, 3582d, 4734d.
Federal Reserve Agent, 581d.
Federal Reserve Banks, 580d.
Federal Reserve Districts, (map), 581a.
Federal supremacy, 5981a.
Federal Trade Commission, 2148c.
Federated Malay States, 2148d.
Federation of Labor, American, 3286a.
Fee, 2163c.
Feeble-minded, Education of, 2149a.
Feeding babies, 528b.
*Feeding Her Birds,* 4451.
*Feeding Her Sheep,* 4451.
Feeling, 2149c.
Fee simple, 2080c, 2163c.
Fee tail, 2080d, 2163c.
Feet of birds, 735d.
Feint, 2151c.
Feldspar, 2150b, 2563c, 2688b.
Félibrige, 4848c.
Felix, Antonius, 2150c, 4529d.
Felix V, 285b.
Felix the Fortunate, 5619a.
Fellahs, 1965d.
Fellowship, 2150c.
Felony, 2150d.

Felt, 2151a.
Felt-hat making, 2712d.
Felu Falls, 5302b.
Feminine gender, 2415a.
Femoral arteries, 391a, facing 1388.
Femur, 7d, 5399b.
Fencing, 2151a.
Fenelon, Francois de Salignac, 2151c.
Fengo, 2676c.
Fenians, 2151d.
Fennec, 1828a.
Fennel, 2151d.
*Fenris Wolf, The,* 4051a.
Feodor, 4606c.
Ferdinand V (Aragon), 2152d, 3069b.
Ferdinand (Bulgaria), 991b.
Ferdinand (Portugal), 4783a.
Ferdinand I, II (Holy Roman emperors), 2152a.
Ferdinand II (the Two Sicilies), 2152b.
Ferdinand IV (Naples), 2152c.
Ferdinand the Great, 5610b.
Fermentation, 2153a.
Fermented liquors, 2153c.
Fermented tea, 5723c.
Fernando Po, 84b, 5476b.
Fernie, B. C., 2153d.
Ferns, 2154b.
Ferrero, Guglielmo, 2155a.
Ferret, 2155b.
Ferric hydrate, 3435b.
Ferris wheel, 2155c.
Ferry, 2155d.
Fertilization of plants, 914a.
Fertilizer, 101d, 810a, 2156a.
Fertilizers, in the United States, 5954d.
Fessenden detector, 6328c.
Festivals, 2157d.
Festus, Porcius, 2158a, 4529d.
Fetid horehound, 2835c.
Fetic wood witch mushroom, 4016b.
Fetish, 2158a.
Feud, 776d, 6047a.
Feudal Age, 90c.
Feudalism, 1359c, 2158b.
Fever, 2159b.
Feverfew, 2159d.
Fez, 1556d.
Fez, Morocco, 2159d.
Fezzan, 5881d.
Fiat money, 2160b.
Fiber, 2160c.
Fibrin, 2161a.
Fibrinogen, 775c, 2161a.
Fibrous membranes, 3727c.
Fibrous roots, 5078d.
Fibrovascular bundles, 5545d.
Fibula, 5399d.
Fichte, Johann Gottlieb, 2161c.
Fiction, 2161b.
Fidelis, 3560b.
Fiddle Creek Canyon, 4506c.
Fiddler crab, 2163b.
Fidus Achates, 24a.
Fief (feudalism), 2158c.
Fief (law), 2163c.
Field, Bosworth, Battle of, 5009d.
Field, Cyrus West, 2164a.
Field, David Dudley, 2163d.
Field, Eugene, 2164c.
Field, Marshall, 2165b.
Field, Stephen Johnson, 2164a.
Field artillery, 237a, 403a.
Field Columbian Museum, 2165c.
Field glass, 2166a.
Fielding, Henry, 2166b.
Fielding, William Stevens, 2166c, 4525a.
Field marshal, 3663d.
Field officers, 4929b.
Field of the Cloth of Gold, 2166d.
Field sparrow, 5482a.
Field stone, 988b.
Field vole, 6112c.
Fife, 2167a.
Fifteen-ball pool, 4754a.
Fifteen decisive battles, 2167a.
Fifth Avenue (New York), 4206c.
"Fifty-four forty or fight," 4410a, 4738d, 5985b.
Fig, 2168b, 4743b.
Figaro, 2169a.
Figg, James, 4830b.
"Fighting Bob," 2104b.
"Fighting Joe," 2830c.
*Fighting Temeraire,* 4451, facing 5918.
Figure-eight knot, 3270c.
Figure of speech, 2169b.
Fiji Islands, 2169c.
Filament, 2223d.
Filbert, 2736c.
Filibusters, 2170a, 2698b.
Filioque, 2610b.
Filipino, 4631a.
Filippino Lippi, 3455c.
Fillmore, Millard, 2170b.
Fillmore, Utah, old capitol building, 6013c.
Filming textbooks, 3982d.
Filter, 2173c.
Final consumption, 1562c.
Final papers in naturalization, 4079c.
Financial crisis of 1837, 6028b.
Finch, 2174a.
Findlay, O., 2174a.
Findon, Scotland, 2654b.
Fine, 2174c.
Fine arts, 390c, 2174d.
Fingal's cave, 1241d, 2176a.
Finger lakes, 1244b, 4196c.
Finger print identification, 2175b.
Finial, 2175c.
Finland, 2175d.
Finlay River, 4536b.
Finnan haddie, 2654b.
Finney, James, 6100a.
Finsen, Niels Ryberg, 2177b.
Fiord, or fjord, 2177c, 4283d.
Fir, 2177d.
Fire, 2178b.
Fire alarm, 2182a.
Fire alarm, Telephone, 5740b.
Firearms, 2179d.
Fireball, 2180a.
Firebird, 564d.
Fire blight, 4542d.
Fire clay, 1411b.
Firecrackers, 2180b.
Fire damp, 1447b, 2180c.
Fire department, 2180d.
Fire engine, 2181a.
Fire escape, 2181d.
Fire extinguisher, 2181b.
Firefly, 2182a.
Fire insurance, 3005a.
Fireless cooker, 2182c.
Fire losses, Comparison of, 2179c.
Fire-maker, 1088d.
Fire-makers, Ancient, 2178d.
Firenze la Bella, 2211a.
Fire opal, 4388c.
Firepan Mountains, 5398c.
Fire prevention, 2178c.
Fireproofing, 2183b.
Fireproof paint, 4447c.
Fireworks, 2183c.
Fire worship, 2183d.
Firing bath, 4649d.
Firing china, 1355b.
Firing circuit, 5605a.
Firing of pottery, 4797b.
Firm, 4518c.
Firmament, 5402c.
First aid, in poisoning, 281c.
First aid to the injured, 6361b.
First battle of Bull Run, 995a.
First "boss" of New York state, 1013a.
First Continental Congress, 4985b.
First crusade, 1652a.
First degree murder, 4007d.
*First in, first out* (game), 2377b.
First lieutenant, 3408d.
First mortgage, 3959a.
First newspapers, 4186a.
First papers in naturalization, 4079c.
First partition of Poland, 4724c.
First patent flour, 2221c.
First Punic War, 5059a.
First Sikh War, 5380b.
First Thanksgiving, The, 5780c.
First triumvirate, 1042b, 4750b.
*First Woodpecker, The,* 5573a.
Firth of Clyde, 1442a.
Firth of Forth Bridge, 923a.
*Fir Tree, The,* 5576d.
Fish, 2184a.
Fish, Ages of, 3419c.
Fish, Hamilton, 2188d.
Fish, Stuyvesant, 2189a.
Fish Creek, Battle of, 3793c.
Fish crow, 1648d.
Fish culture, 2186b.
Fisher, Carl G., 1824b.
Fisher, Carl H., 3447d.
Fisher, Harrison, 2189b.
Fisher, Sydney Arthur, 2189c.
Fisheries, Bureau of, 1512c.
Fisheries, Canadian, 1107b.
Fisheries, Deep-sea, 2187a.
Fisheries of Canada, 1107a.
Fisherman Peak, 1057b.
Fisherman's knot, 3270b.
Fisher marten, 3667a.
"Fish from the fence," 4816b.
Fish hawk, 2189d.
Fish hook, 257d.
Fishing eagle, 2189d.
Fishing laws, 2186d.
Fishing rod and line, 257d.
Fish in the United States, 5952b.
Fish oils, 4357b.
Fish study, 4087a.
Fishworm, 1906c.
Fiske, John, 2190b.
Fiske, Minnie Maddern, 2190c.
Fisk University, 2190d.
Fitch, Clyde [William], 2191a.
Fitch, John, 2191a.
Fitchburg, Mass., 2191c.
Fitzgerald, Edward, 2191d.
Fitzpatrick, Sir Charles, 2192a.
Fitzsimmons, Robert, 4830c.
Fiumicino River, 5100a.
Five acts of bankruptcy, 575d.
Five Civilized Tribes, 2192b.
"Five-Foot Shelf," 2010b.
Five Forks, Battle of, 2193a.
Five-leaved ivy, 6100c.
Five Nations, 2193b.
Fives, 2193c.
Fixed ammunition, 237a.
Fixed capital, 1172d.
Fixed oils, 4357b.
Fixed pulley, 4867b.
Fixed stars, 2193d.
Fjord, 2177c, 4283d.
Flag, 2194a.
Flag, United States, 2194b.
Flag-day program, 2196c.
Flagella, 537d, 5506a.
Flageolet, 2201a.
"Flag-floppers," 5377a.
Flagg, James Montgomery, 2201a.
*Flag is Passing By, The,* 2195d.
Flagler, Henry M., 2220d.
Flag of—
Austria-Hungary, 2198b.
Belgium, 2198b.
Denmark, 2198d.
Dominion of Canada, 2198a.
France, 2198d.
Germany, 2198d.
Greece, 2199a.
Governor-General of Canada, 2198c.
Italy, 2199a.
Netherlands, 2199a.
Portugal, 2199b.
Russia, 2199c.
Spain, 2199c.
Switzerland, 2199d.

Flag of—*Continued*
Truce, 2201b, 6271a.
Turkey, 2199d.
Flag signals, 5377d.
Flags of—
American republics, color plate, following 2196.
British Empire, 2196b.
Europe, color plate, preceding 2197.
States of the Union, color plates, facing 5976.
Flail, 2201c.
Flamboyant tracery, 5853d.
Flame, 2201c.
Flamen, 2202d.
Flamingo, 2202d.
Flammarion, Camille, 2203b.
Flammenwerfer, 3456a.
Flanders, 2203c.
Flannel, 2204a.
"Flapjacks," 5920d.
Flashing, 1197d.
Flatfish, 2204a.
Flathead (fish), 4953a.
Flathead Indians, 1361b, 2204b.
Flathead Lake, 3905a.
Flatiron, Electric, 1988a.
Flats, 4022a.
Flat signatures (music), 4028b.
Flattery, Cape, 2204c.
Flatulence, 4466c.
Flavelle, Joseph Wesley, 2204c.
Flavian Amphitheater, 1495d.
Flavius Anicius Justinianus, 3193d.
Flavius Claudius Julianus, 3181d.
Flavor and nutrition, 4318d.
Flavoring extracts, Adulteration of, 63a.
Flax, 2160c, 2204d, 3450b.
*Flax, The,* 5571c.
Flaxman, John, 5276d.
Flea, 2206b.
Fleabane, 2207a.
Fleece wool, 6354c.
Fleet, 5678a.
Fleet officers, 4929c.
Fleet Street, London, 3489c.
Fleming, Sir Sandford, 1143d, 2207a.
Fleming oscillation valve, 6328b.
Flemings, 666b.
Flemish language and literature, 2207c.
Flemish Plain, 667a.
Flemish rabbit, 4907a.
Flesh-eating animals, 1191a.
Flesh-eating plants, 1191c.
Fleshy roots, 5078c.
Fletcher, Horace, 2208a.
Fletcher, John, 640a.
Fletcherizing, 2207d.
Fleur-de-lis, 2208b.
Flexibility, 2208d.
Flexner, Dr. Simon, 3733d, 5042b.
Flexors, 373a.
Flicker, 2208d.
*Flight into Egypt,* 4451, facing 5098.
Flint, 2209b.
Flint, Mich., 2209b.
Flint corn, 1585b.
Flint glass, 2508a.
Flintlock musket, 4034a.
Float, 257d.
Floating baths, 623b.
Floating islands, 3071a.
Floating mines, 5605b.
Floating seeds, 5293d.
Flodden Field, 2209d.
Flood, 2209d.
Flood plains, 2210d, 5025b.
Floods of the Mississippi, 3852c.
Flood tide, 5808b.
Floors, 1196a.
Flora, 2211a.
Floralia, 2211a.
Florence, Ala., 2212a.
Florence, Italy, 2211a.
Florentine mosaic, 3960d.
Floriculture, 2844b.
Florida, 2212b.
Florida, Gulf of, 2220b.
Florida, University of, 2220c.
Florida East Coast Canal, 1147a.
Florida East Coast Railway, 2216a.
Florida Keys, or Florida Reefs, 2220c.
Florida purchase, 3898b.
Florida Straits, 2220b, 3775a.
Florida water, 4585b.
Florida yew, 6393c.
Florin, 2220d.
Flotow, Friedrich von, 2220d.
Flotsam, jetsam and ligan, 2221a.
Flounder, 2221a.
Flour, 2221b.
Flour corn, 1585d.
Flower buds, 976b.
Flowering plants, 4617a.
Flowerless plants, 1654a.
Flowers, 2223a.
Flowing liquids, Laws of, 2886c.
Flowing tracery, 5853d.
Floyd, John Buchanan, 2229c.
Flue pipes, 4412b.
Fluids, Molecular force in, 3878b.
Fluorescence, 2229d.
Fluorides, 2230b.
Fluorine, 2230b.
Fluor spar, 2230c, 2688b.
Flute, 2230c.
Flux, 2230d.
Fly, 2231a.
Fly blows, 778d.
Flycatcher, 2235c.
Flying cat, 2240d.
Flying Dutchman, 2235a.
*Flying Dutchman, The,* 6122a.
Flying fish, 2235c.
Flying lizard, 1850b, 4861d.
Flying machine, 2236a, 6168a.
Flying machine, First, 3314a.
Flying marmot, 2240d.
Flying spider, 5498a.
Flying squirrel, 2240b.
Fly mushroom, 4015b.
Fly up the creek, 2785c.
Foch, Ferdinand, 2241b.
Focus, 3380a.
Fodders, Comparative value of, 181c.
Fog, 2240d, 4921c.
Fog horns, 5394d.
Fog signals, 2241a.
Föhn, 1356d, 5661b.
Foley, John H., 5276d.
Folkething, 1759b.
Folklore, 2241c.
Folk songs, 4019d.
Follicle, Hair, 2659b.
*Follow the Leader* (game), 2374b.
Fomalhaut, 446a.
Fondant, 1153d.
Fond du Lac, Wis., 2241d.
Fonseca, Hermes da, 907a.
Fonseca Bay, 4228d.
Font (type), 5930c.
Fontainebleau, 2242a.
Foo-chow, China, 2345c.
Food, 2242b.
Food Administration Board, 6177a.
Food fish, 2185c.
Food groups, 4319a.
Food habits, 2740d.
Food materials, Composition of (chart), 2245a.
Food of birds, 732b.
Food of great souls, 4712a.
Food products, Preservation of, 2247b.
Foods, Coloring of, 61d.
Food starches, 5530b.
Foodstuffs and beverages of the United States, 5963a.
Food value of—
Apples, 298a.
Bacon, 536a.
Bananas, 568d.
Beans, 633b.
Beef, 658c.
Bread, 909a.
Buckwheat, 975c.
Butter, 1020a.
Buttermilk, 3803d.
Celery, 1246c.
Cheese, 1291b.
Chestnuts, 1307d.
Chicken meat, 4802a.
Cocoanut, 1457d.
Cod, 1459c.
Cream, 3803d.
Dried corn, 1588b.
Eggs, 1961b.
Fresh milk, 3803a.
Grains, 2554a.
Grapes, 2573d.
Green corn, 1588d.
Ham, 2672d.
Honey, 2826c.
Lentils, 3381a.
Lettuce, 3390d.
Macaroni, 3549c.
Mackerel, 3568c.
Molasses, 3876c.
Muskmelons, 4035a.
Mutton, 4038d.
Nuts, 4313c.
Oatmeal, 4327d.
Onions, 4378b.
Oysters, 4440c.
Parsnips, 4516b.
Peaches, 4539b.
Peanuts, 4541c.
Pears, 4543a.
Peas, 4534b.
Plums, 4709d.
Pork, 4764a.
Potatoes, 4794d.
Radishes, 4912c.
Raisins, 4925b.
Rice, 5007d.
Rye, 5132b.
Skim milk, 3803a.
Strawberries, 5591c.
Walnuts, 6131a.
Wheat, 6263d.
Food values, Comparison of, 911a.
Fool hen, 2629a.
Foolish fire, 2918b.
Fools, Feast of, 2252a.
Fool's gold, 4879d.
Foot (measure), 2252b.
Foot, The, 2252c.
Foot and mouth disease, 2253c.
Football, 2254b.
Foote, Andrew Hull, 2260d.
Foote, Arthur, 2261a.
Foote, Mary Hallock, 2261b.
Footings, 986a.
Foot of fly, 2234c.
Foot-pound, 2261b.
Foot-pound-second, 3881c.
Foot-rot, 4394d.
Footwear, 837c.
Forage crops, 182a.
Foraminifera, 4332d.
Forbes-Robertson, Sir Johnston, 2261c.
Forbidden City, 3398b, 4552b.
Force, 2261c.
Force bills, 2262a, 6141a.
Force pump, 4869c.
Forcing houses, 2617c.
Ford, Edward Onslow, 5277a.
Ford, Henry, 2262c.
Ford, Paul Leicester, 2263a.
Forecast division, 6229d.
Forecasting centers, 6231b.
Foreclosure, 3958d.
Forefathers' monument, 4674a.
Foreign coins, Value of, 1468a.
Foreign commerce of the United States, 5970b.
Foreign concession, Tokyo, 5828d.
"Foreign devils," 1353b.
Foreign exchange, 718c.
Foreign words, Plurals of, 4310c.
Foreordination, 2263b.

Foreshortening, 2263c.
Forest areas of Alaska, 139b.
Forest areas of Canada, 1103b.
Forest areas of the United States, 5962b.
Forest army worm, 5759c.
Forest cantons, 5662a.
"Forest City," 1426b.
Forester kangaroo, 3202c.
Foresters, Ancient Order of, 2263c.
Foresters, Independent Order of, 2263d.
Foresters of America, 2263d, 2319a.
Forest reserves, 2266b, 4197c.
Forest reserves of Ontario, 4382c.
Forest resources of the United States, 5953b.
Forestry, Division of, 106b.
Forest service, 2266b, 4676d.
Forest tent caterpillar, 5759c.
Forests and forestry, 2264a.
Foretelling the future, 5632a.
Forgery, 2266d.
Forget-me-not, 2267a.
Forging (artillery), 404c.
Forked veining, 6047a.
Formaldehyde, 2267b.
Formalin, 2267b.
Formation of soil, 5430c.
Formicarium, 274d.
Formosa Island, 2267b.
Forms of address, 51c.
Forrest, Edwin, 2267d.
Forster, George, 2869c.
Fort, 2269d.
Fort Bliss, 2018b.
Fort Castle, 2548b.
Fort Collins, Colo., 2268a.
Fort D. A. Russell, 1308d.
Fort Dearborn, 2268a.
Fort Dodge, Ia., 2268c.
Fort Donelson, 2269b.
Fort Douglas, 5177c.
Fort Duquesne, 2268d.
Forte, 4021d.
Fort Frances, Ont., 2268d.
Fort Garry, Man., 6316b.
Fort Hancock, 5189d.
Forth and Clyde Canal, 5260d.
Forth cantilever bridge, 2269b, 4898a.
Fort Henry and Fort Donelson, 2269b.
Fort Howe Park, 4506b.
Forth River, 2269a.
Fortification, 2269d.
Fortifications of Paris, 4494d.
Fortissimo, 4021d.
Fort Logan H. Roots, 3466b.
Fort Madison, Ia., 2270d.
Fort Marion, 5145b.
Fort Mims, Massacre of, 2271a.
Fort Monroe, or Fortress Monroe, 2271b.
Fort Moultrie, 2271b.
Fort Necessity, 6201c.
Fort Niagara, 2271c.
Fort Peck project, 3905d.
Fort Pitt, 2268d, 4685d.
Fort Rodman, 4140c.
Fort Rosecrans, 5188a.
Fort Sam Houston, 5185a.
Fort Scott, Kan., 2271c.
Fort Smith, Ark., 2272a.
Fort Snelling, 5165a.
Fort Sumter, 2272c.
Fort Taylor, 3234d.
Fort Thomas, 1282d.
Fort Tompkins, 5535d.
Fortuna, 2272d.
Fortune-telling, 1813b, 5637c.
Fort Vermilion, 163a.
Fort Wadsworth, 5535d.
Fort Washington, 1382d.
Fort Wayne, Ind., 2273a.
Fort William, 2273c.
Fort Worth, Tex., 2274a.
Forty Immortals, 3003c.
"Forty-niners," 1067a.
Forty-seventh problem in Euclid, 4880c.
Forty-two-line Bible, 2144a.
Forum, 2274d.
Forward pass, 2256d.
Fossil, 2275d.
Fossil bone, 5919d.
Fossiliferous marbles, 3645b.
Fossil resins, 4978d.
Foster, Sir George Eulas, 2276d.
Foster, John Watson, 2276b.
Foster, Stephen Collins, 2277b.
Fostoria, O., 2277c.
Foucault, Jean Bernard Leon, 2277d.
Foul, in boxing, 875a.
Foul bill of health, 4884d.
Foundations, 986d.
"Founder of British Columbia" 1845b.
"Founder of railways," 5547c.
Foundling hospitals, 2278a.
Foundry, 2278b.
Fountain, 2278c.
Fountain of Castalia, 4511b.
Fountain of perpetual youth, 2279b, 4751a.
Fourdrinier machine, 4480c.
Four o'clock, or marvel of Peru, 2279b.
Fourth Crusade, 1652c.
Fourth of July, 2940d.
Fourth of July program, 2941a.
Fowl, 2279d.
Fowl, Parts of, 4800b.
Fowls, How to judge, 4801a.
Fox, 2280a.
Fox, Charles James, 2281a.
Fox, George, 2281a.
Fox, Gilbert, 2658c.
Fox, John [William] Jr., 2281b.
*Fox and the Crow,* 3319d.
*Fox and the Grapes,* 2122c.
Foxglove, 2281c, 3719a.
Foxhound, 2281c.
Fox Indians, 2280d.
Fox-nosed monkey, 3379b.
Fox River, 6331d.
Fox sparrow, 5481d.
Fox squirrel, 5518c.
Foxtail grass, 2281d, 2576a.
Foxtail millet, 3807d.
Fox terrier, 2282a, 5763d.
Fractional distillation, 1809b.
Fractional method of canning, 2247d.
Fractions, Common, 2282b.
Fracture, 2293a.
Fra Diavolo, 2293b.
Fra Elbertus, 2857d.
Fra Giovanni da Fiesole, 254b.
*Fram, The,* 240d, 4059b.
Frames (Montessori Method), 3918c.
Framingham, Mass., 2293c.
Franc, 2293d.
France, 2294a, 6156b, 6157d, 6161a, 6163c.
France, Anatole, 2308d, 6414d.
France, Flag of, 2198d.
Franchise, 2309a.
Francis I, II (France), 2309b.
Francis I, II (Holy Roman Empire), 2309c.
Franciscans, 2310a, 3732d.
Francis Ferdinand, Archduke, 2310c.
Francis Joseph I, 2310a.
Francis of Assisi, 2310d.
Francke, August Hermann, 2310d.
Franco-German War, The, 2305a, 2311a.
Francois of Lorraine, 2638b.
Francolin, 2311d.
Franconia Flume, 6275b.
Franconia Notch, 4155d.
Franconia Range, 4155d, 6274d.
Frankfort, Ind., 2312a.
Frankfort, Ky., 2312b.
Frankfort-on-the-Main, Germany, 2313a.
Frankfort-on-the-Oder, Germany, 2313b.
Franking privilege, 2313c.
Frankland, or Franklin, 2314a, 5754b.
Franklin (Canada), 2314a.
Franklin, Benjamin, 2314b, 3403a, 3428a, 4572a, 4790d.
Franklin, Sir John, 2316b, 2582d, 3727a, 4727b.
Franklin, Pa., 2316c.
Franklin, State of, 5754b.
Franklin, William, 4600a.
Franklin panes, 3398a.
Franklin's grouse, 2629a.
Franks, 2316c.
Franz Josef Land, 2317a.
Fraser River, 2317b.
Fraserville, Que., 2318a.
Fraternal societies, 2318b.
Fraud, 2320a.
Fraunces' Tavern, 4208a.
Fraunhofer lines, 5489b.
Fréchette, Louis Honoré, 2320b.
Freckled heron, 754d.
Freckles, 5400b.
Frederick, Md., 2322d.
Frederick I, II, III (Prussia), 2320d.
Frederick William III (Prussia), 2322b.
Frederick I (Holy Roman Emperor), 2321c.
Frederick III (German emperor), 2321c.
Frederick VIII (Denmark), 2321d.
Frederick I, Barbarossa, 2321c.
Fredericksburg, Battle of, 2323a.
Frederick William (Brandenburg), 2322a.
Frederick William I, III & IV (Prussia), 2322b.
Fredericton, N. B., 2323b.
Free Baptists, 587a.
Free cities, 2323c.
Free coinage, 1467c.
Freedmen's Bureau, 2323c.
*Freedom,* Statue of, 6194d.
Freedom of navigation, 4094b.
Free-hand cutting for kindergartens, 3246a.
Free-hand tearing for kindergartens, 3247a.
Freehold estate, 2080c.
Free mail delivery, 3442c, 4791a.
Freeman, Mary E. Wilkins, 2323d.
Freeman's Farm, Battle of, 5206a.
Freeman's standard of handwriting, 1937a.
Freemasons, 2318d, 3680b.
Free Methodist Church, 2324a, 3756d.
Free pensions, 4366d.
Freeport, Ill., 2324b.
Free ports, 2324c.
Free-soil party, 2324d.
Freestone peach, 4538c, 5541d.
Freethinkers, 2325a.
Freetown, West Africa, 2325b.
Free trade, 2325b.
Free will, 2326b.
Free verse, 234a.
Freezing, 2326d.
Fregata, 2340a.
Freight locomotive, 4919b.
Freight rates, Great Lakes, 5968c.
Fremont, John Charles, 2327b, 2527c, 4977b.
Fremont, Neb., 2328a.
Fremont, O., 2328a.
Fremont Peak, 6369a.
Fremsted, Olive, 2328b.
French, Alice, 2328d.
French, Daniel Chester, 2329a.
French Academy, 18b, 3003c.
French Academy of Fine Arts, 3003d.
French Academy of Moral and Political Science, 3003d.

French Academy of Sciences, 3003d.
French accent, 4840c.
French and Indian Wars, 2329a.
French army, 384c.
French chalk, 5688d.
French Congo, 1535a.
French Guiana, 2330d.
French horn, 2836b.
French Indo-China, 2331d.
French language, 2332a.
French literature, 2333a.
French monasteries, 3883a.
French national hymn, 2894a.
French Revolution, The, 2334b, 3651b.
French River, 4380c.
French Somaliland, 2337a, 5438c.
French tariffs, 5703c.
Frenchtown, Battle of, 4924c.
French truffles, 5889d.
Freneau, Philip, 228c, 231a.
Fresco, or fresco painting, 2337b.
Fresco secco, 2338a.
Fresh eggs, How to identify, 1962b.
Fresh-water hydra, 4746c.
Fresh-water mussel, 5344c.
Fresh-water pearls, 4543d.
Fresh-water polyp, 2884a.
Fresh-water snail shell, 3879d.
Fresh-water sponge, 5507b.
Fresno, Cal., 2338a.
Freud and Freudian views, 4859c, 5597c.
Frey, 2338b.
Freyja, 2338c.
Friar, 2338d.
Friar bird, 2279c.
Friars' lands, Purchase of the, 5680d.
Friars Minor, 2310a.
Fricker, Edith, 5469c.
Friction, 2339a.
Friction match, 3694c.
Friday, 2339b.
Friedland, Battle of, 4065b.
Friend, Florence, 3635b.
Friendly Islands, 5834a.
Friends, Society of, 4883c.
Fries rebellion, 205a.
Frieze, 1507d.
Frieze of the Parthenon, 617a.
*Frieze of the Prophets,* 4451.
Frigate, 2339c.
Frigate bird, or man-of-war bird, 2339d.
Frigga, or Frigg, 2340b.
Frigid zones, 6415d.
Frijoles, 634b, 3766c.
Fringed gentian (color plate), facing 2224.
Fringe tree, 2340b.
Fringing reef, 1577a.
Frisches Haff, 6102c.
Frisii, 4128a.
Frobisher, Sir Martin, 2340c, 4279b.
Frobisher Bay, 4279b.
Froebel, Friedrich Wilhelm August, 2340c.
Frog, 2341c.
Frog, Study of the, 4087b.
Frog fish, 256a.
*Frog in the Middle* (game), 2377a.
Frohman, Charles and Daniel, 2342c.
Froissart, Sir Jean, 2342d.
*From Greenland's Icy Mountains,* 2895d.
Fronde, 2343a.
Fronds, 2154c.
Frontal, 2738d.
Frontenac, Comte Louis, 1120d, 2343b.
Front Range, 4172b.
Frost, 2343c.
Frostbite, 2344b.
Frosts in Canada, 1098-1099.
Froude, James Anthony, 2344c.
Fruit, 2344c.
Fruit, Comparison of tropical, 1061c, 2215c.
Fruit, How to can, 2248d.
Fruit growing, Intensive, 3010b.
Fruit offering, 5138a.
Fruit preserves, Adulteration of, 63a.
Fruits that grandfather did not know (color plate), facing 2344.
Frustum, 1528c, 4877c.
Fruticose lichens, 3406b.
Fry, 2186d.
Frying, 1566d.
Fu-chow, China, 2345c.
Fuchs, Leonard, 2345d.
Fuchsia, 2345d.
Fuel, 2346a.
"Fuel City of the Fuel State," 1408c.
Fuels of the human body, 4315c.
Fuel value of foods, 4317a.
Fugitive slave laws, 2346c.
Fujiyama, 2346d.
Fulcrum, 3392b.
Fulgurite, 2347a.
Full chord, 4032a.
Full corporal, 1594c.
Fuller, Melville Weston, 2347b.
Fuller, Sarah Margaret, 4421c.
Fuller's earth, 2347c.
Fuller's teasel, 5727b.
Fulmar, 2347d.
Fulmination, 2348a.
Fulton, N. Y., 2348a.
Fulton, Robert, 2348b.
Fumigation, 2349a.
Funchal, Madeira, 3578d.
Functional diseases, 1804c.
Fundamental Constitution, 4266b, 5460d.
Fundamental note, 5445c.
Fundamental Orders of Connecticut, 5977c.
Fundamental tone, 2691a.
Fundy, Bay of, 841b, 2349b.
*Funeral March,* 1363a.
Funeral Mountains, 1722a.
Fungi, 2349c.
Fungicides, 3001b, 3002c.
Fungoid diseases, 1806a.
Fungus killers, 3002c.
Funston, Frederick, 2349d, 3774b.
Fur and fur trade, 2351a.
Fur-bearing animals, 5952a
Furies, 2353a.
Furlong, 2353a.
Furnace, 2353b.
Furness, Horace Howard, 2353d.
Furniture, 2354a.
"Furniture City," 2562a.
Furnivall, Frederick James, 2356c.
Fur seal, 5281a.
Fur-seal legislation, 5282c.
Fusan, Chosen, 1364b.
Fuse, 2356d.
Fusing point, 3726c.
Fust, Johann, 2143d.
Future tense, 5757b.
Futurists, 2936d.
Fyles, Franklin, 2658d.
Fyt, Johannes, 4454a.

# G

G, 2357a.
Gabers, 2487b.
Gable, 2357b.
Gable roof, 5067b.
Gabriel, 2358a.
Gadfly, 2842b.
Gadolinium, 1294d.
Gadsden, Ala., 2358a.
Gadsden Purchase, 2358b.
Gadshill, 1791a.
Gadski, Johanna W. Tauscher, 2358c.
Gadwall, 2358d.
Gaea, 4042b, 5818d.
Gaekwar, 597b.
Gael, 2359b.
Gage, 2407c.
Gage, Thomas, 2359b, 3396b, 4985d.
Gaillard Cut, 4473c.
Gainesville, Fla., 2359c.
Gainsborough, Thomas, 2359d.
Gaited horse, 5014d.
Gaius Plinius Caecilius Secundus, 4707d.
Gaius Plinius Secundus, 4707c.
Galahad, Sir., 2360b.
Galapagos Islands, 2360d.
Galata, 2527c.
Galatea, 2361a, 4876a.
Galatia, 2361b.
*Galatians, Epistle to the,* 2361c..
Galatz, Rumania, 5104d.
Galaxy, 3805c.
Galba, Servius Sulpicius, 2361c.
Galdhöpiggen, 4283d.
Gale, Leonard, 3957c.
Galen, or Galenus, Claudius, 2361d.
Galena, 2362a, 3355d, 5386b.
Galerius, 4967b.
Galesburg, Ill., 2362a.
Galicia, 2362c.
Galilee, Palestine, 2363a.
Galilee, Sea of, 2363c.
Galileo, 2363d.
Gall, Franz Joseph, 2364d, 4651c.
Gallatin, Albert, 2365a.
Gallatin Peak, 3904c.
Gall bladder, The, 2365b.
Galley, 2365c.
Galley, Printer's, 4823c.
Gall fly, 2367a.
Gallinule, 2366a.
Gallipoli, 2366b, 6159a.
Gallium, 2366c.
Gallo, Island of, 4602a.
Gallon, 2366d.
Galloping consumption, 5896a.
Galloway cattle, 1237b.
Galls, 2366d.
Gall stones, 2365c.
Galsworthy, John, 2367c.
Galt, Sir Alexander Tilloch, 2368a.
Galt, John, 1142d.
Galt, Ont., 2368c.
Galton, Sir Francis, 2368d, 2781d.
Galvani, Luigi, 2369a.
Galvanic battery, 2369b.
Galvanism, 2369c.
Galvanized iron, 2369c.
Galvanometer, 2369d.
Galveston, Tex., 2370a.
Galveston and Brazos Canal, 1147a.
Gama, Vasco da, 2371b.
Gama grass, 2371c.
Gamaliel, 2371c, 4529a.
Gambetta, Leon, 2371d.
Gambia, 84b, 2372a.
Gambia River, 2372b.
Gamboge, 2372c.
Gambrel roof, 5067b.
Game, 2372c.
Game-cock brigade, 4661c.
Gamel, 2357c.
Game laws, 2372d.
Game laws (birds), 742d.
Game preserves, Private, 2373a.
Game reservations, 2373a.
Games, Public, 2378b.
Games, Quiet, 2378a.
Games and plays, 2373b.
Games for kindergartens, 3242b.
Games for older children, 2377a.
Games for young children, 2374b.
Gamma, 1033c.
Gammer Grethel, 2626b.
Gananoque, Ont., 2379b.
Ganar, burla, burla-ganar, burla-burla, korumbo, 41b.
Ganges canals, 2380a.
Ganges crocodile, 1641d.

Ganges River, 2379c.
Ganglia, 4121b.
Gang plow, 4709b.
Gangrene, 2380a.
Gang saws, 5227c.
Gannet, 2380b.
Ganymede, 2380c.
Gapes, 2380d.
Gar, 2380d.
Garage, 2381a.
Garbage, 2381a.
Garces, Francisco, 4137a.
Garcia, Manuel, 2382b.
Garcia family (Spain), 2382a.
Garcia Y Iniguez, 2382c.
Garda Lake, 3080a.
Garden, Alexander, 2383c.
Garden, Mary, 2382d.
"Garden City," 1312b.
Garden cress, 1632c.
*Garden Gate* (game), 2375c.
Garden hypnotist, 4760b.
Gardenia, 2383b.
Gardening, 2383b.
Garden mint, 3838b.
Garden of Eden, 5908d.
Garden of the Gods, 2387b.
*Garden of the Hesperides*, 4451.
Garden pea, 4534a.
Garden spider, 5497d.
Garden State, 4161b.
Gardiner, Samuel Rawson, 2387b.
Gardiner, Stephen, 2387c.
Gardner, Mass., 2387d.
Garefowl, 478a.
Garfield, Harry Augustus, 2392a, 6306d.
Garfield, James Abram, 2388a.
Garfield, James Rudolph, 2392b.
Garfield, N. J., 2392b.
Garfield Beach, Great Salt Lake, 6015c.
Garfield Memorial, 1426c.
Gargantua, 4907c.
Garget, 4722d.
Gargle, 2392c.
Gargoyle, 2392d.
Garib River, 4396c.
Garibaldi, Giuseppe, 2393a.
Garland, Hamlin, 2393c.
Garlic, 2394a.
Garneau, Alfred, 1142b, 2394c.
Garneau, François Xavier, 1139c, 2394b.
Garneau, Hector, 2394c.
Garner, R. I., 2539b.
Garnet, 2394c.
Garnet-hued rubies, 5101a.
Garnishment, 2395a.
Garonne River, 2395a.
Garrett, Almeida, 4781b.
Garrick, David, 2395b.
Garrison, William Lloyd, 2395c.
Garrison court-martial, 1613c.
Garrote, 2396a.
Garter, Order of the, 2396a.
Garter snake, 2396c.
Gary, Elbert Henry, 2396d.
Gary, Ind., 1392b, 2397b.
Gary school system, 2397d.
Gas, 2400b.
Gasca, 4603b.
Gas clouds, 2402c.
Gas coal, 1443b.
Gasconade, 2402d.
Gascony, 2402d.
Gas engine, 2403a.
Gases, Expansion of, 2113d.
Gas fields of the United States, 5956d.
Gas heating, 2752c.
Gaskell, Elizabeth Cleghorn, 2404b.
Gasoline, 2404d.
Gasoline engines, 2403c.
Gaspé, Philippe Aubert de, 1139d, 1142b, 2405d.
Gas pressures, 2890b.
Gas tar, 1448d.
Gaston, François, 3393d.
Gaston, Lucy Page, 280d.
Gastric juice, 5558c.
Gastric neuralgia, 4130c.
Gastritis, 2406a.
Gastropod, 2406c.
"Gate City of Florida," 3101c.
"Gate City of the South," 460a.
"Gate of the Rockies," 3864a.
Gates, Horatio, 1033b, 2406c.
"Gateway of India," 804c.
"Gateway to the Highlands of Ontario," 4514d.
Gath, Palestine, 2407a, 4638d.
Gatineau River, 4429c, 4888c.
Gatling, Richard Jordan, 2407b.
Gatling gun, 2407b.
Gatun Locks, 4472a.
Gauchos, 4467c.
Gaugamela, Battle of, 314d.
Gauge, 2407c.
Gauge of wire, 6319c.
Gaul, 477d, 2407c.
Gauley River, 2596b.
Gauntlet, 2408b.
Gaur, 2408c.
Gautama, 1703d.
Gauze, 2408d.
Gavial, 2409a.
Gavotte, 2409b.
Gay, John, 2409c.
Gay-Lussac, Joseph Louis, 2409c.
Gaza, Palestine, 2409d, 4638d.
Gazelle, 2410a.
Gazzetta, 4186b.
Gearing, 2410d.
Gear shifting, 516b.
Gecko, 2410d.
Gedaliah, 3138d.
Gehenna Valley, 2411a.
Geikie, Sir Archibald, 2411a.
Geisha girls, 3121b.
Geissler, Heinrich, 2411b.
Geissler's tubes, 2411b.
Gelatin, 2411d.
Gelée, Claude, 2412a.
Gellivare, Lapland, 3332a.
Gelsemium, 2412c, 3125c.
*Gemara*, 2755a, 5693c.
Gemini, 2412c.
"Gem of the Mountains," 2909a.
Gems, 2412d.
Gendarmes, 2414d.
Gender, 2414d, 4294d.
Genealogical table of House of York, 6395a.
Genealogical table of the Stuarts, 5595a.
General army staff, 5519d.
General Church of the New Jerusalem, 5652c.
General City, Peking, 4552c.
General court-martial, 1613c.
General education board, 2416a.
General Federation of Women's Clubs, 6349d.
General Grant National Park, 4504b.
"General Grant" (tree), 4504c.
Generalization, 2416a.
General land office, 3309b.
General legacies, 3370c.
General lien, 3408d.
General officers (army), 381a.
General pardon, 4492b.
General partnership, 4518d.
General power of attorney, 4803d.
General-purpose breeds (poultry), 4800a.
General sensations, 5302d.
"General Sherman" (tree), 1059b, 4504c.
General staff of the German army, 5520a.
General storms, 5563a.
General strike, 5592d.
General therapeutics, 5785b.
General trade-mark, 5855c.
Generations, Alternation of, 2154d.
Genesee River, 2416b.
*Genesis*, 2416c.
Genet, Edmond Charles Edouard, 2416d.
Geneva, Lake, 2417b.
Geneva, N. Y., 2417c.
Geneva, Switzerland, 2417a.
Geneva Arbitration, 2418a.
Geneva Convention, 2418b.
Geneva foot, 2252c.
Genghis Khan, 2418c.
Genil, 2418d.
Gennesaret, Lake of, 2363c.
Genoa, Italy, 2419a.
Genre painting, 4449c.
Gensan, Chosen, 1364b.
Genseric, 1205d, 2419d, 3381b, 6033d.
Gensfleisch, Johann Henne, 2644b.
Gentian, 2420a.
Gentian root, 1378d.
Gentiles, 2420c.
Genus, 1410a, 2420d.
Geodesy, 2420d.
Geodetic survey, 1450a.
Geoffrey, Count of Anjou, 4699d.
Geoffrey of Monmouth, 2421b.
Geographical societies, 2421b.
Geography, 2422a.
Geological surveys, 2432c.
Geology, 2433a.
Geometric insets (Montessori Method), 3919d.
Geometric tracery, 5853d.
Geometry, 2443a.
George I, II, III, IV, V (England), 2448a.
George I (Greece), 2451c.
George, David Lloyd, 2449c.
George, Henry, 2450c.
George, Lake, 2451a.
George, Saint, 2451b.
George, William R., 2451d.
George Eliot, 2010c.
George Junior Republic, 2451d.
George Peabody College for Teachers, 4534d.
Georges' Banks, 1459b.
Georgetown, British Guiana, 944a.
Georgetown, P. E. I., 2452b.
Georgetown, Penang, 4557b.
Georgetown University, 2452c.
George Washington University, The, 2452d.
Georgia, 2453a.
Georgia, Russia, 2461a.
Georgia, Strait of, 3177b, 6186a.
Georgia, University of, 2461b.
Georgiana, Me., 3606d.
Georgian Bay, 2461c.
Georgian Bay Ship Canal, 2461d.
Georgia pine, 4677c.
*Georgics*, 1794b, 6061c.
Geranium, 2462b.
Gerard, James Watson, 2463a.
Gerbert, 4426a.
Gerin-Lajoie, Antoine, 1142b, 2463b.
Germ, 2463b.
German accent, 4840c.
German army, 384a.
German boar spear, 5486b.
German East Africa, 2463c.
German Empire, 2467b.
German geographical mile, 3796c.
Germania, 5676c.
Germanicus Caesar, 5805d.
German imperial elector, 1978c.
German intrigue in South America, 6173b.
Germanium, 1294d.
German language, 2464a.
German literature, 2464d.
German measles, 3709d.
German merchant marine, 3740c.
German national hymn, 2894a.
German Reformed Church, 4961c.
German sausage, 5223c.
German sculpture, 5276b.
German silver, 2466a.
German Southwest Africa, 2466b.
German tariffs, 5703c.
Germantown, Battle of, 2467a.
Germany, 2467b.

Germany, Flag of, 2198d.
Germicide, 285d.
Germination, 2482c.
Germ theory of disease, 1804b.
Gerome, Jean Leon, 2483c.
Geronimo, 290a, 2483c.
Gerry, Elbridge, 2484b, 6377b.
Gerrymander, 2483d
Gerund, 4518a.
Geryon, 2780c.
Gesner, Abraham, 3233a.
Gessler, 5744b.
Gethsemane, 2484c.
Gettysburg, Battle of, 2484c, 4661c.
*Gettysburg Address*, 2485d, 3444a.
Geyser, 2486a.
Ghats Mountains, 2487a.
Ghauts Mountains, 2487a.
Ghebers, 2487b.
Ghent, Belgium, 2487c.
Ghent, Treaty of, 2488a, 6143d.
Gherkins, 1668b, 4661d.
Ghetto, 2488a.
Ghibellines, 2634d.
Ghiberti, Lorenzo, 2488c.
Ghinea, West Africa, 2637b.
Ghirlandajo, Domenico del, 2488d.
Ghosts, 2489a.
Ghurush, 4660d.
Giacomo Della Chiesa, 683c.
Giant, Mount, 54a.
Giant cactus, 1039b.
Giant clam, 1406a.
Giant crab, 1621a.
Giants, 2489c.
Giant salamander, 5169d.
Giants' Causeway, 2490a.
Giant snipe, 5421a.
Giant stag beetle, 5520d.
Giant water bugs, 6214d.
Giant yellow slug, 5409a.
Gibbon, 2490b.
Gibbon, Edward, 2490c.
Gibbons, James, 2491a.
Gibraltar, 2491b.
"Gibraltar of America," 4894b.
"Gibraltar of the East," 52c.
Gibson, Charles Dana, 2491d.
Gibson, John, 5276d.
Gideon, 2492b.
Gideon's band, 2492b.
Giffard, Henri, 2239c, 2994c.
"Gift of the River," 4237c.
Gifts (kindergarten), 3243b.
Gila, 2492c.
Gila monster, 2492c.
Gilbert, Alfred, 5277a.
Gilbert, Sir Humphrey, 2492d, 4926d.
Gilbert, Sir William Schwenk, 2493a.
Gilbert Peak, 5935d.
*Gil Blas*, 3385a.
Gilboa, Battle of, 1709d.
Gilbreth, Frank B., 3986b.
Gilder, Richard Watson, 2493b.
Gilding, 2493c.
Gilead, 2493d.
Gillette, William Hooker, 2494a.
Gillott, Joseph, 4556c.
Gills, 2494a.
Gillyflower, 6129d.
Gilman, Daniel Coit, 2494b.
Gilmore, Patrick Sarsfield, 2494c.
Gilsonite, 425c.
Gimel, 2357c.
Gimlet, 842c.
Gin, 2494c.
Ginger, 2494d.
Gingerbread tree, 1842a.
Gingham, 2495b.
Ginkgo, 2495b.
Ginnie, West Africa, 2637b.
Ginning, 1606b.
Ginseng, 2495c.
Giordano, Luca, 2496a.
Giorgione, 2496c.
Giotto, 2496c.
Gipsy, 2647c.
Giraffe, 2497a.
Giralda bell tower, 5321a.
Girard, Stephen, 2497d.
Girard College, 2497d.
Girardon, Francis, 6276a.
Girasol, 4388c.
Girder, 2498b.
Girgenti, Sicily, 115b.
Girl kite, 3265b.
*Girl of the Limberlost, A*, 4769a.
Girondists, 2498c.
Gist, Christopher, 6201b.
Giuliani, Mauro, 2638d.
Gizeh, Egypt, 4878a.
Gizzard, 2498c.
Glace Bay, N. S., 2498d.
Glacial Period, 2499a.
Glacial valley, 6023a.
Glacier, 2500b.
Glacier des Blois, 3744d.
Glacier National Park, 2501d, 4504c.
Glacier on Mount Sefton, 4220b.
Glacier Park, Canada, 4506b.
Gladiators, 2503d.
Gladiolus, 2504a.
Gladstone, William Ewart, 2504c, 2822d.
Glanders, 2505b.
Glands, 2505d.
Glands of the skin, 5400d.
Glasgow, Scotland, 2506a.
Glasgow, University of, 2506d.
Glass, 2507a.
Glass burnisher, 1354d.
Glass snake, 2510c.
Glass sponge, 5506c.
Glasswort, 201d.
Glauber, Johann Rudolf, 2510d.
Glauber's salt, 2510d.
Glauce, 3715d.
Glaucoma, 769c.
Glazing of pottery, 4797b.
*Gleaners, The*, 3808c, 4451.
Glendower, Owen, 6125c.
Glens Falls, N. Y., 2511a.
Gliders, 2237c.
Glittertind, Mount, 4283d.
Globe, 2511c.
Globe, Ariz., 2512a.
Globe cactus, 1039b.
Globigerinae, 4848a.
Glommen River, 4284a.
"Glorious Revolution" of 1688, 6290d.
Glosso-pharyngeal nerves, 4121a.
Glottis, 3337a.
Gloucester, England, 2512a.
Gloucester, Mass., 2512b.
Gloucester City, N. J., 2512d.
Glove, 2513a.
Gloved cat, 6283c.
Gloversville, N. Y., 2513d.
Glowlamp detector, 6328a.
Glowworm, 2182b.
Gloxinia, 2514a.
Glucinum, 1294d.
Gluck, Alma, 2514b.
Gluck, Christoph Willibald, 2514c, 4389c.
Glucose, 1587b, 2514d.
Glue, 2515a.
Gluten, 2515b.
Gluten bread, 909c.
Glutton, 2515c.
Glycerine, 2515d.
Glycerol, 2516a.
Glycogen, 3467b.
Glyn, Elinor, 2516c.
Glyptodon, 2516c.
Gnaeus Magnus Pompeius, 4750a.
Gnat, 2516d, 3965b.
Gneiss, 2517a.
Gnomes, 2129b, 2517a.
Gnomon, 5629b.
Gnu, 2517b.
Goat, 2517c.
Goat Island, 4224b.
Goat Island (harbor of Newport, R. I.), 4093a.
Goatsucker, 2518b.
Gobbo, 4366b.
Gobi, Desert of, 2518c.
God, 2518d.
Goderich, Ont., 2519d.
Godfrey de Bouillon, 2519d.
Godhaven, Greenland, 2618b.
Godiva, Lady, 2520b.
*God Save the King*, 226a, 2520c.
God's story, 2541b.
Godthaab, Greenland, 2618b.
Godwin, Earl, 2688a, 2692b.
Godwin, Mary, 5346c.
Godwin-Austen, Mount, 3214d.
*Goeben, The*, 6167c.
Goethals, George Washington, 2520c, 4474a.
Goethe, Johann Wolfgang von, 2521b.
Goff hammers, 3268b.
Going-to-the-Sun Mountain, 2502c.
Goiter, 2522c.
Golconda, India, 2522c.
Gold, 2522d.
Gold-beating, 2525d.
Gold certificates, 3887a.
Gold Coast, 84b, 2526c.
Gold cure, 3218b.
Golden Age, 2526d.
Golden Age of French literature, 2333c.
Golden Age of Latin literature, 3340d.
*Golden Ass*, 4302b.
Golden bull, 2526d.
Golden-chain tree, 3288c.
Golden clavaria, 4014c.
Golden-crowned kinglet, 3257c.
Golden-crowned water thrush, 4432c.
Golden eagle, 1897b.
Golden Fleece, 2527a, 3715c.
Golden Gate, The, 2527a.
Golden Gate Canyon, 6391c.
Golden Gate Park, 5190d.
Golden Horn, 1557b, 2527c.
*Golden Legend*, 704a.
Golden lilies, 1353b.
Golden marguerite, 1265a.
"Golden-mouthed," The, 1373a.
Golden oriole, 4413c.
Golden pheasant, 4619b.
Golden plover, 4708b.
Golden robin, 564d.
Goldenrod, 2527d.
Golden Rule, 1533d.
Golden Shell Valley, 4458a.
*Golden Stairs*, 4451.
Golden State, 1056b.
Golden wax bean, 634b.
Golden-winged warbler, 6137c.
Golden-winged woodpecker, 2208d.
Goldfinch, 1149d, 2528b.
Goldfish, 2528c.
Gold lace, 2529a.
Gold leaf, 2526a.
Gold of California, 1067a.
Gold pens, 4556d.
Goldschmidt, Otto, 3449a.
Goldschmidt, Madame Otto, 3448d.
Goldsmith, Oliver, 2529a.
Gold standard, 3886b.
Golf, 2530a.
Goliath, 1709b, 2532b.
Gombo, 4366b.
Gomez, Jose Miguel, 1661b.
Gomez, Juan Vicente, 6050d.
Gomez y Baez, 2532c.
Gompers, Samuel, 2532d.
Gondokoro, Uganda, 4238b.
Gondola, 2533a.
Gondolier, 2534b.
Gonds, 2943a.
Gonsalvo de Cordova, 2533c.
Gonzaga, Eleanora, 5819d.
Goober (peanut), 4540d.
Good Friday, 2533d.
Good Hope, Cape of, 2534a.
"Good Queen Bess," 2012b.
Goodrich, Edna, 2534d.
Good roads movement, 106c, 5030b.

Goods and chattels, 1286a.
Good Templars, International Order of, 2534b.
Good will, 2534c.
Goodwin, Nathaniel Carl, 2534c.
Goodyear, Charles, 2534d.
Goosander, 3745d.
Goose, 2535a.
Gooseberry, 2536a.
Goosefoot, 2536c.
*Goose That Laid the Golden Eggs*, 3322b.
Gopher, 2536d.
Gopher State, 3827a.
Gopher tortoise, 5846a.
Gordian knot, 2537a.
Gordius, 2537a.
Gordon, Charles George, 2537b.
Gordon, Charles William, 2537c.
Gordon, Daniel Miner, 2538a.
Gordon, John Brown, 2538c.
Gordon Pasha, 2537b.
Gordon setter, 5317b.
Gorgas, William Crawford, 2538c, 3968b, 4474b, 5864a.
Gorgons, 2539a, 3723a.
Gorgonzola cheese, 1291c.
Gorilla, 2539b.
Gorky, Maxim, 2540a.
Gorse, 2536c.
Goshawk, 2540c.
Goshen, 2540d.
Goshen, Ind., 2540d.
Gosnold, Bartholomew, 2541a.
Gospels, 2541b.
Gossamer, 2541d.
Gosse, Edmund William, 2542a.
Gosse, Philip Henry, 2542a.
Göta River, 5646c.
Göteborg, Sweden, 2542b.
Gotham, 2542b.
Gothenburg, Sweden, 2542b.
Gothic architecture, 326b.
Goths, 2542c.
Gotland Island, 5646b.
Gottschalk, Louis Moreau, 2543a.
Gough, John Bartholomew, 2543b.
Gouin, Sir Lomer, 2543c.
Goujon, Jean, 2543d.
Gould, George Jay, 2544c.
Gould, Helen Miller Shepard, 2544a.
Gould, Jay, 2544a.
Goulden, Richard, 4477b.
Gounod, Charles François, 2545a.
Gour, 2408c.
Gourd, 2545c.
Gourde, 1468b.
Gout, 2546a.
Government, 2546b.
*Government, A Frame of*, 4562c.
Government aid of schools, 5242b.
Governmental revolution, 4983c.
Government annuities, Canadian, 4366c.
Government inspection of meat, 3713d.
Government of Canada, 1114a.
Government regulation of railroads, 4915d.
Government schools of the United States, 5246c.
Governor (machine), 2547b.
Governor (politics), 2547c.
Governor-General of Canada, 1114c, 2547d.
Governor-General's flag (Canada), 2198c.
Governor's Island, 2548a.
Gowk, 205b.
Goyt River, 3748c.
Gracchus, Caius Sempronius (158-121 B. C.), 2548c.
Gracchus, Tiberius Sempronius (210 B. C.), 2548b.
Gracchus, Tiberius Sempronius (?160-133 B. C.), 2548b.
Grace, Days of, 2548c.
Graces, The Three, 2548d.
Grackle, 2549a.
Graded literature lists, 3463a.
Grades on railroads, 4918b.
Grady, Henry Woodfin, 1603b, 2549a.
Graeae, 4591b.
Graeco-Roman style of wrestling, 6363a.
Grafting, 2549a.
Grafting by approach, 2551c.
Graham, Andrew J., 5338d.
Graham, George Perry, 2552a.
Graham, Sylvester, 2222a.
Graham flour, 2221d.
Graham Land, 2552b.
Grail, The Holy, 2813a.
Grain beetle, 2552c.
Grain elevator, 2552d.
Grain elevator at Port Arthur, 4766a.
Grains, 2553d.
Grain weevil, 6240a.
Grakle, 2549a.
Gram, 2554d, 3759b.
Gramineae, 4326c.
Grammar, 2554b.
Gramophone, 5690c.
Grampian Hills, 2557c.
Grampus, 2557d.
Granada, Spain, 2557d.
Granada (city), Spain, 2558b.
"Granary of California," 5194c.
"Granary of Russia," 5117a.
Granby, Que., 2558c.
Grand Alliance, 1448c, 5609d.
Grand Alliance, War of the, 2329b.
Grand Army of the Republic, 2558d.
Grand Banks, 1459b, 2559a.
Grand Canal (China), 1145b.
Grand Canal of Venice, 6051c.
Grand Canyon of the Colorado, 2559b.
Grand Canyon of the Yellowstone, 6391c.
Grand Chute, 300b.
Grand Coteau des Prairies, 1097a.
Grand Duchy of Hesse, 2788b.
Grande-Terre, 2630a.
Grand Falls, N. B., 2560b.
Grand Falls, Newfoundland, 4152c.
Grand Falls of the Hamilton, 2676c, 4888d.
Grand Falls of the Saint John, 5153d.
Grandfather greybeard, 1685c.
Grandfather's clause, 2560c.
Grand Forks, B. C., 2560b.
Grand Forks, N. D., 2561a.
Grand Island, Neb., 2561b.
Grand Isle, 6063b.
Grand jury, 3192b.
Grand larceny, 3333c.
Grand mal, 2064a.
Grand' Mère, Que., 2561c.
"Grand Monarch," 2304b, 3508b.
Grand mufti, 5343a.
"Grand Old Man of Canada," 5902d.
"Grand Old Man of China," 3430c.
Grand Opera, 4389a.
Grand Opera House, Paris, 4497a.
Grand piano, 4660b.
Grand Pré, N. S., 2561d, 3231d.
Grand Rapids, Mich., 2562a.
Grand Remonstrance, 2563a.
Grand sachem, 5694d.
*Grands Boulevards*, Paris, 4495a.
Grand slam (cards), 924c.
Grand Teton, Mount, 6388c.
Grand Trianon, 6071d.
Grand Trunk Canal, 6238b.
Grand Trunk Pacific, 1112b.
Grand Trunk Railway tunnel, 5148c.
Grand vizier, 5911b, 6103a.
Grange, 2563b.
Granite, 988c, 2517a, 2563c.
Granite City, Ill., 2564b.
Granite pavement, 5029b.
Granite Peak, 3904c.
Granite quarries, 4885d, 6065b.
Granite State, 4154b.
Granny knot, 3270c.
Gran Sosso, Mount, 291a.
Grant, General Frederick Dent, 2564c.
Grant, George Monro, 2564d.
Grant, Jesse, 2566b.
Grant, Robert, 2565d.
Grant, Ulysses Simpson, 2566a, 6147d, 6149b.
Grant's gazelle, 2410c.
Granular conjunctivitis, 2572d.
Granular eyelids, 769b, 2572d.
Granulation, 2572d.
Grape, 2573a, 4653b.
Grapefruit, 2574c.
Grape mildew, 2350c.
Graperies, 2617c.
Grape sugar, 2514d.
Grapevines as decorations, 2574c.
Grape weevil, 6240b.
Graphite, 2575b, 3817d, 4557c.
Graphite Mountains, 6063b.
Grasmere, 6357d.
Grasses, 2575c.
Grass hemp, 5395b.
Grasshopper, 2577b.
Grasshopper sparrow, 5482a.
Grass parrakeet, 4512d.
Grass sponge, 5507a.
Grattan, Henry, 2578a.
Gratz, Austria, 2578b.
Grave Creek Mound, 3976d.
Gravelet, Jean François, 774d.
Gravenhage, 2657a.
Gravers, 6351c.
Gravitation, 469d, 2578c, 4188c.
Gravity, Center of, 2579a.
Gravity, Specific, 321c, 2579c.
Gravity cell, 1981d.
Gravity on the sun's surface, 5624c.
Gravity system of waterworks, 2887b.
Gray, Asa, 2580c.
Gray, Elisha, 2580d, 5732c.
Gray, George, 2581a.
Gray, Robert, 4408c.
Gray, Thomas, 2581b.
*Gray Book*, 782a.
Gray duck, 2358d.
Gray gold, 2523d.
Gray hair, 2659d.
*Gray Herbarium*, 2777d.
Graylag goose, 2535c.
Grayling, 2581d.
Gray linnet, 3451d.
Gray matter, 891b.
Gray's Harbor, Wash., 9d, 6187b.
Gray squirrel, 5518c.
Gray wolf, 6343d.
Graz, Austria, 2578b.
Great American Desert, 1431d, 6010d.
Great Aughrabies, 4396d.
Great auk, 478a.
Great Australian Bight, 2582a.
Great Barrier Reef, 484d.
Great Basin, 5948b.
Great Bear, 637d.
Great Bear Lake, 2582b.
Great Bear River, 2582d.
*Great Bible*, 1617b.
Great blue heron, 2784a.
Great Bras d'Or, 897b.
Great Britain, 2582b.
Great Britain copyrights, 1575d.
Great Britain parcel post, 4491d.
Great Buddha, The, 3123b.
Great Charter, 1282b, 3593a.
Great circle, 4335d.
Great Coalition, 1448c.
"Great Commoner" (America), 964b.
"Great Commoner" (England), 4685a.
Great Dane, 2594c.
Great Divide, 1485d.
Great Dividing Range, 4183a.
*Great Eastern*, 1037d, 5355a.
Great Elector, 2322a.
Greater Antilles, 283d.

Greater New York, Government of, 4213d.
Greater plantain, 4700a.
Greater Serbia, 5311b, 6153b.
Greatest common divisor, 2594d.
Greatest common factor, 2124d.
Great Falls, Mont., 2595c.
Great Falls of the Yellowstone, 6391c.
Great flying fish, 2235d.
Great gray slug, 5409a.
*Great Harry*, 6181d.
Great horned owl, 4435a.
Great Kanawha River, 2596a, 6253d.
Great Lakes, The, 2596b, 5968c.
Great Manitoulin Island, 3633d.
Great Mogul diamond, 1786b.
Great National Pike, 1669c.
Great Nicobar Island, 4232a.
Great Northern Railroad, 4921a.
"Great Pacificator," 1411d.
Great Peasant War, 4544c.
Great Pedee River, 5456d.
Great pompano, 4748d.
Great Powers, 4804a.
*Great Privilege, The*, 4128b.
Great Pyramid, 4878c.
Great rhododendron, 5003b.
Great Russians, 5113b.
Great Saint Bernard, 5146c.
Great Salt Desert, 4594d.
Great Salt Lake, 2598c, 6011c.
Great Salt Water, 1302d.
Great Sand Desert, 4594d.
Great Sandy Desert, 4403c.
Great scallop, 5230c.
Great schism, 2610a.
Great Seal (British), 4830b.
Great seal of the United States, 2777b, 5279d, 5975a.
Great Shoals, 1669c.
Great Slave Lake, 2599a.
Great Slave River, 2599c, 4537b.
Great Smoky Mountains, 4260d, 5749d.
Great Sphinx, 5496a.
Great spotted woodpecker, 6353a.
*Great Stone Face*, 6275b.
Great Sunda Islands, 5627a.
Great Synagogue, 5669b.
Great talent, 5689b.
Great titmouse, 5821c.
"Great Tom," 3436c.
Great Trek, 790b, 1171b, 4396a, 5864c.
Great union, 2197a.
Great Valley, 5946d.
Great Wall of China, 1348a.
Great War, 6151a.
Great Yarmouth, England, 6384d.
Grebe, 2599c.
Grecian national hymn, 2894a.
Grecian sphinx, 5495c.
Greece, 2600a.
Greece, Flag of, 2199a.
Greek accent, 4840d.
Greek antiquities in Uruguay, 6007d.
Greek Church, 2610a.
Greek cross, 1464a.
Greek fire, 2610c.
Greek foot, 2252a.
Greek gods, 4044a.
Greek language, 2610d.
Greek literature, 2612a.
Greek sculpture, 5273b.
Greek Tragedy, Father of, 2141d.
Greeley, Colo., 2613a.
Greeley, Horace, 2613b, 3399a, 3440a.
Greely, Adolphus Washington, 2614b.
Green, 2614c.
Green, Anna Katharine, 5049c.
Green, Edward H., 2615b.
Green, Hetty Howland Robinson, 2615a.
Green, John Richard, 2615b.
Greenaway, Kate, 2615b.
Greenback party, 2615c.
Greenbacks, 2615d.
Green Bay, Wis., 2616a.
*Green Book*, 782a.
Green brier, 2616c.
Greene, Nathanael, 2616c.
Greene, W. Friese, 3989c.
Greenfield, Mass., 2617a.
Green gage plum, 4710b.
Greenhouse, 2617b.
Greenland, 2617c.
Greenlets, 6090d.
Green manures, 3639c, 5088a.
Green Mountain, 3979c.
Green Mountain Boy Memorial, 6065a.
Green Mountain Boys, 2618c.
Green Mountains, 2618c.
Green Mountain State, 6062a.
Greenough, Horatio, 2618d.
Green peziza mushroom, 4014d.
Green River, 2619a.
Green Room, 6274a.
Green russula, 4014d.
Greensboro, N. C., 2619a.
Greensburg, Pa., 2619b.
Green tea, 5723c.
Green turtle, 5920b.
Greenville, Miss., 2619c.
Greenville, S. C., 2619d.
Greenville, Tex., 2620a.
Greenville, Treaty of, 6228a.
Green vitriol, 1573d.
Greenway, Thomas, 2620b.
Greenwich, England, 2620c.
Greenwich Observatory, 4330c.
Green woodpecker, 6353a.
Gregg, John Robert, 5339b.
Gregg shorthand, 5360a.
Gregorian calendar, 1051d.
Gregorian Christianity, 375a.
Gregory (Popes), 2621a.
Grenade, 2622a.
Grenadier, 2622a.
Grenfell, Sir Wilfred Thomason, 2622b.
Grenoble, France, 2622d.
Grenville, Lord, 4984b.
Grenville Canal, 5014b.
Gresham's law, 2623a.
Gretna Green, Scotland, 2623b.
Grévy, François Paul Jules, 2623c.
Grey, Albert Henry George Grey, 2623c.
Grey Charles, 2624a.
Grey, Edward, Viscount Grey of Falloden, 2624b.
Grey, Lady Jane, 2624d.
Greyhound, 2625b.
Greylock, Mount, 692c, 3683d, 5677b.
Gridiron, Diagram of, 2255b.
Gridiron pendulum, 4559c.
Grids, 5562a.
*Grief*, 5150d.
Grieg, Edvard Hagerup, 2625c.
Griffin, Walter B., 1395c.
Griffin vulture, 3304b.
Grimes' Golden apple, 6254b.
Grimm, Jakob Ludwig, 2626a.
Grimm, Karl Wilhelm, 2626a.
*Grimms' Fairy Tales*, 2625d.
Grinnell Land, 2015a.
Grinnell Mountain, 3907d.
Grippe, 2911c.
Griscom, Samuel, 5084c.
Gris-nez, Cape, 2626b.
Grissbach Falls, 5659d.
Gristle, 1207b.
Grizzly bear, 637a.
"Grizzly Giant" (tree), 5309c.
Grocer's itch, 3087a.
Groin vault, 6041c.
Gromwell, 2626b.
Groningen, Holland, 2626c.
Grosbeak, 2626c.
Gross negligence, 4110c.
Gross register, 5835b.
Gross tonnage, 5835b.
Grote, George, 2627a.
Grotefend, Georg, 1671a.
Grotius, or De Groot, Hugo, 2627b.
Grouard, Alta., 2627b.
Grouard, Emile, 2627c.
Ground cuckoo, 5027d.
Ground-fish, Methods of catching, 2187c.
Ground hemlock, 6393c.
Ground hog, 2627c.
Groundhog day, 2145b, 2628a.
Ground ivy, 3090c.
Ground water, 2434d.
Ground woodpecker, 6353a.
Grouping of stars, 5528b.
Grouse, 2628a.
Grove cell, 1982d.
Grover, Edwin Osgood, 1630c.
Grub, 3336c.
Gruber, Eberhard, 219c.
Grunt, 2629c.
Grunter, 2643a.
Guadalajara, Mexico, 2629c.
Guadalquivir River, 5473b.
Guadalupe Hidalgo, Treaty of, 2629d, 3764a.
Guadeloupe Island, 2629d.
Guadiana River, 4779d.
Guainia River, 5023c.
Guajan Island, 2630b.
Guam Island, 2630b.
Guan, 2630b.
Guanaco, 2631a, 3471a.
Guanajuato, Mexico, 2631a.
Guano, 2631b.
Guarani, 4486a, 6006b.
Guarantee, 2631c.
Guarantor, 2631c.
Guardian, 2631d, 6137a.
Guards, Prison, 4828a.
Guarneri, Giuseppa, 6089c.
Guatemala, 2632a.
Guatemala (city), 2633b.
Guatemala la Nueva, 2633b.
Guava, 2633d.
Guava myrtle, 4040a.
Guaviare River, 4413c.
Guayaquil, Ecuador, 2634b.
Guayaquil, Gulf of, 5449c.
Guayule, 5097c.
Guden River, 1757d.
Gudrun, 5380a.
Guelder-rose, 5422a.
Guelph, Ont., 2634c.
Guelphs and Ghibellines, 2634d.
Guericke, Otto von, 1992d.
Guerin, Jules, 3311a, 4475a.
Guernsey cattle, 1235b.
Guernsey Island, 2635a.
Guidi, Tommaso, 4449a.
Guido of Arezzo, 2635b.
Guido Reni, 2635c.
Guido Reni's *Aurora*, 479b.
Guija, Lake, 5179c.
Guild, 2635d.
Guilder, 1468b.
Guildhall, The, London, 3489d.
Guilford, or Guilford Courthouse, Battle of, 2636b.
Guillemot, 2636c.
Guillotine, 2636d.
Guilmant, Felix Alexandre, 2637a.
Guilt offering, 5138a.
Guinea, 2637b.
Guinea (coin), 2637c.
Guinea, Gulf of, 2637c.
Guinea fowl, 2637d, 4619c.
Guinea pig, 2638a.
Guine Falls, 5302b.
Guinevere, 398c, 3306d.
Guipure lace, 3290a.
Guiscard, Robert, 4248b
Guise, 2638b.
Guitar, 2638c.
Guiteau, Charles J., 2392a.
Guizot, Francois Pierre Guillaume, 2638d.
Gulden, 1468b.
Gulf Stream, 2639b, 3775b, 4334b.
Gulick, Luther, 3738a.
*Gulliver's Travels*, 4303a.
Gulls, 2640b.
Gum, 2640d.
Gum Arabic, 2641a.

Gumbo, 2641c, 4366b.
Gum resins, 2641c.
Gum shoes, 5098d.
Gun, 378c, 404b, 1157d.
Gunboat, 2641c.
Guncotton, 1248a, 2642a.
Gun metal, 950b.
Gunpowder, 2642a.
Gunpowder Plot, 2642d.
Gunther, King, 4226c, 5380a.
Gurnard, 2643a.
Guru Govind, 5380a.
Gustave V, 2643a.
Gustave, Sir Henri, 3169b.
Gustavus (Gustavus Vasa) (Sweden), 2643c-2644b.
Gustavus Adolphus, 2643d, 5647a, 5792a.
Gustavus Vasa, 2643c.
Gutenberg, Johannes, 2644b.
*Gutenberg Bible*, 4824b.
Guthrie, James, 4666b.
Guthrie, Okla., 2644d.
Guthrum, 183b.
Gutta-percha, 2645b.
Gutter mosquito, 3966d.
Gutzkow, Karl Ferdinand, 2646a.
Guy Fawkes day, 2144a.
Guyot, Arnold, 2646a.
Guyot, Mount, 5749d.
Guyot's Peak, 761a.
Gwelo, Rhodesia, 5002b.
Gymnasium, 2087a, 2646b.
Gymnasium (in Germany), 2646d.
Gymnastics, 2646d, 4653d.
Gymnosperms, 862b, 1611c, 2647a.
Gypsum, 2647b, 2688b.
Gypsy, 2647c.
Gypsy moth, 2648b.
Gyroscope, 2649d.

# H

H, 2651a.
Haakon, VI, 4288b.
Haakon VII, 1366d, 2651b.
Haakon the Old, 4288b.
Haarlem, Holland, 2651d.
Habakkuk, 2652a.
Habana, Cuba, 2715a.
Habeas corpus, 2652a, 3593c.
Habichtsburg (family), 2687b.
Habit, 2652c.
Habitants, 1122a, 1866d.
Habit spasms, 1947b.
Hackberry, 4130a.
Hackensack, N. J., 2653c.
Hackensack River, 4163c.
Hackett, James Keteltas, 2653d.
Hackmatack, 3333d, 5694b.
Haddock, 2654a.
Hades, 2654b, 4712a.
Hadj, or Jajj, 2654b.
Hadley, Arthur Twining, 2654c, 6381a.
Hadrian (Publius Aelius Hadrianus), 2655a.
Hadrian's tomb, 2655b.
Hadrian's villa, 2655b.
Hadrian's wall, 4150c, 5056c.
Haeckel, Ernst, 2655b.
Haffs, 2470a.
Hagar, 3069a.
Hag-dips, 3997c.
Hagen, 4226c.
Hagenbeck, Karl, 2655d.
Hagerstown, Md., 2656a.
Haggai, 2656b.
Haggard, Sir Henry Rider, 2656c.
Haggart, John Graham, 2656d.
Hague, The, 2656d.
Hague Peace Conference, 4535b.
Ha Ha Bay, 5142a.
Hahnemann, Samuel Christian, 2657d.
Haida Indians, 4899a.
Haig, Sir Douglas, 2658a, 6157a, 6164a.
Haiks, 375a.
Hail, 2658a.
*Hail Columbia*, 33c, 2658c.
Haileybury, Ont., 2659a.
Haiphong, 2685d, 5835a.
Hair, 2659a.
Hairdressing, 2660c, color plate, facing 2962.
Hair dyes, 2660b.
Hair follicle, 5400b.
Hair worm, 2661d.
Hairy Bear Mountain, 4261d.
Hairy-cap moss, 3969a.
Hairy-nosed wombat, 6349a.
Hairy opuntia, 1039b.
Hairy vetch, 6074b.
Hairy woodpecker, 6352d.
Haiti, 2661d.
Hajj, 2654b, 3714c.
Hake, 2663d.
Halbert pecan, 4546b.
Halcyon days, 2664a.
Haldimand, Sir Frederick, 2664a.
Hale, Edward Everett, 2664b.
Hale, John P., 4665a.
Hale, Nathan, 2665a.
Hale, Sarah Josepha, 5780d.
Haleakala, Mount, 4504d.
Halévy, Ludovic, 2665d.
Half-breeds (politics), 2390d.
Half Dome Rock, 6397c.
Half mast, 2194d.
Halftone, 2665d.
Haliburton, Thomas Chandler, 2666c.
Halibut, 2666d.
Halicarnassus, Mausoleum at, 5318d.
Halifax, Eng., 2667b.
Halifax, N. S., 2667c.
Halifax *Gazette*, 4187d.
Halite, 5175d.
Hall, Asaph, 2668d, 4092c.
Hall, Charles F., 4727c.
Hall, G[ranville] Stanley, 2669a.
Hallam, Henry, 2669b.
Halle, or Halle an Der Saale, Germany, 2669c.
Halle, University of, 2669d.
Halleck, Fitz-Greene, 2669d.
Halley, Edmund, 2670a.
Halley's comet, 2670a.
Hall of Columns, 5782d.
Hall of Fame, 2670b.
Hall of Highest Peace, 4551d.
Hall of Intense Thought, 4552b.
Hall of the Chosen Slain, 6021b.
Hall of the Classics, 4552c.
Hallowe'en, or Halloweven, 2670d.
Hallowe'en program, 2671c.
Hall rifle, 5409d.
Hallstatt, Austria, 4109b.
Hallucination, 2671b, 4583d.
Halo, 2672a, 4238c.
Halogens, 2672b.
Hals, Frans, 2672b.
Halteres, 1880a.
Ham, 2672c.
Ham (Bible), 2673a.
Hamadryad, 525d, 1867a.
Hamamelis, 6342a.
Haman, 2081a, 2673b.
Hamburg (state), 2674a.
Hamburg, Germany, 2673c, 2687a.
Hamelin Town, 6245b.
Hameln, Prussia, 6245b.
Hamilcar Barca, 2674a, 2684c.
Hamilton, Alexander, 2148a, 2674b, 6204d.
Hamilton, Bermuda, 2675b.
Hamilton, Mount, 3406c.
Hamilton, O., 2675c.
Hamilton, Ont., 2675d.
Hamilton River, 2676b, 4888d.
Hamitic races, 2673a, 4909c.
Hamlet, 2676c.
*Hamlet*, 1762c.
Hamlin, Hannibal, 2676d.
Hammedatha, the Agagite, 2673b.
Hammer, Pneumatic, 4716b.
Hammer, Throwing the, 2677a.
Hammerfest, Norway, 2677b, 4288d.
Hammerheads, 5337d.
Hammerless shotgun, 5362b.
Hammer of the Monks, 1644a.
Hammock, 2677d.
Hammond, Ind., 2677d.
Hammond, John Hayes, 5842b.
Hammurabi, 533d.
Hampden, John, 2678b.
Hampshire Grants, 6067b.
Hampshire sheep, 5342a.
Hampton, Wade, 2678c.
Hampton Court Conference, 2678d.
Hampton Normal and Agricultural Institute, 378a, 2678d.
Hampton Roads, Battle of, 3890b.
Hampton Roads Conference, 2679b.
Hamster, 2679c.
Hancock, John, 2679d.
Hancock, Mich., 2680a.
Hancock, Winfield Scott, 2680c.
Hand, 2680d.
Hand, The, in palmistry, 4465b.
Handball, 2681b.
Hand bellows, 682a.
Handeck Falls, 5659d.
Handel, George Frederick, 2682b.
Handicap, 2682d.
Hand lead, 3356d.
Hand organ, 2683a.
Hand weaving, 6233c.
Handwriting, Measurement of, 1935d.
Hangbird, 564d.
Hang-chow, China, 2683b.
Hanging, 2683c.
Hanging Gardens of Babylon, 2683c, 5318b.
Hanging valley, 6023a.
Hankow, China, 2684a.
Hanks, Nancy, 3436d.
Hanlan, Edward, 5838b.
Hanna, Marcus Alonzo, 2684a.
Hannay, James, 1142d, 2684c.
Hannibal, 2684c.
Hannibal, Mo., 2685b.
Hannibal, Mo. (Huckleberry Finn's home), 3859c.
Hano, Ariz., 2832a.
Hanoi, Annam, 2685d.
Hanover, House of, 2590a.
Hanover, Ont., 2686a.
Hanover, Prussia, 2686a.
Han River, 1364b.
Hansa, 2686d.
Hansestadte, 2687a.
Hanson, Timothy, 5815c
Hantzsch, Bernard, 541b.
Hapgood, Norman, 2687a.
Happy hunting ground, 2964d.
Hapsburg, or Habsburg, 2687b.
Hara-kiri, 2687c.
Harbor seal, 5283b.
Harcourt, Sir William George Granville Venables Vernon, 2687c.
Hardanger bride, 4285d.
Hardanger Fiord, 2177c.
Hard cider, 1378a.
Hardecanute, 2687d.
Hardening of the arteries, 391b.
Hardhack, 5500d.
Hard maple, 3642b.
Hardness, 2688a.
Hard palate, 3981c, 4457a.
Hard solders, 5433d.
*Hard Times*, 1790b.
"Hardware City," 4141d.
Hard water, 6213d.
Hard wheat, 6262a.
Hardwood charcoal, 1270a.
Hardy, Arthur Sturgis, 2688c.
Hardy, Thomas, 2688d.
Hare, 2689a.
Harebell, 781a, 1086d, 2689d.
Harefoot, 2692a.
Harem, 2690a.
Hargreaves, James, 2690b.
Harlan, John Marshall, 2690c.

Harland, Marion, 5760c.
Harlem River, 4206a.
Harlem River Canal, 1147a.
Harlequin, 2690d.
Harmonica, 2690d.
Harmonic minor scale, 4030b.
Harmonics, 2691a.
Harmony, 2691b, 4031a.
Harmsworth, Alfred Charles William, 4267d.
Harnden, William F., 2116b.
Harness, 2691c.
Harness antelope, 278b.
Harness horse, 2840b.
Harness race, 4908d.
Harney Peak, 5464b.
Harold I, II (England), 2692a.
Harold I, III (Norway), 2692b.
Harp, 2692c.
Harper, William Rainey, 1317d, 2693b.
Harper Memorial Library, 1317b.
Harper's Ferry, 2693c.
Harpies, 2693c.
Harpoon, 2693d.
Harp seal, 5281a.
Harpsichord, 2694a, 4660b.
*Harp That Once through Tara's Halls,* 2692d.
Harpy, 2694a.
Harraden, Beatrice, 2694b.
Harrier, 3665d.
Harriman, Edward Henry, 2694c.
Harriman, Mary D., 4460d.
Harriott, Mrs. F. C., 3955b.
Harris, Joel Chandler, 2694d.
Harris, Robert, 2695a.
Harris, William Torrey, 2695b.
Harrisburg, Pa., 2695c.
Harrison, Benjamin, 2696b.
Harrison, John Scott, 2696d.
Harrison, Mount, 4953b.
Harrison, N. J., 2701d.
Harrison, William Henry, 2702a, 6141d.
Harrison Act, 1453b.
Harris sparrow, 5481d.
Hart, 1739b.
Hart, Albert Bushnell, 2706a.
Harte, [Francis] Bret, 2706b.
Hartebeest, 2707a.
Hartford, Conn., 2707b.
Hartford Convention, 2708a.
Harthacnut, 2687d.
Hartshorn, 2708c.
Harun-al-Rashid, 2708c.
Harvard, John, 2708d.
*Harvard Classics,* 2010b.
Harvard stadium, 5519a.
Harvard University, 2709b.
Harvester, Modern, 4945c.
Harvest fly, 1376b.
Harvestman, 1685c.
Harvest moon, 2710d.
Harvey, Horace, 2711a.
Harvey, Sir John, 2711a.
Harvey, William, 2711b.
Harz Mountains, 2711c.
Hasbrouck Mansion, 4148c.
Hashish, 2711d.
Hashishin, 427d.
Hasmoneans, 3551c.
Hastings, Battle of, 2167c, 2712a.
Hastings, Neb., 2712a.
Hastings, Warren, 2712b.
Hat, 2712c.
Hatching of eggs, 1961a.
"Hat City," 1696c.
Hathaway, Anne, 5332c.
Hathor, 459c, 4936a.
Hatteras, Cape, 2714a.
Hattiesburg, Miss., 2714a.
Haultain, Frederick William Gordon, 2714c.
Haultain, Theodore Arnold, 2714c.
Haunches, 318c.
Hauptmann, Gerhart, 2714d.
Hausas, 4234a.
Hautboy, 4330b.
Hauy, Valentin, 770d.
Havana, Cuba, 2715a.
Havana cigars, 5825c.
Havas agency, 430c.
Havelock, Sir Henry, 2715d.
Haverhill, Mass., 2716a.
Havre, France, 2716d.
Hawaii, 2717a, 4680a.
Hawaii National Park, 4504d.
Hawfinch, 2627a.
Hawk, 2723b.
Hawkesbury, Ont., 2724a.
Hawkeye State, 3033a.
Hawking, 2131a.
Hawkins, Anthony Hope, 2724a.
Hawkins, Sir John, 2724b.
Hawkins, John Isaac, 4660b.
Hawkins, Sir Richard, 2724c.
Hawk moth, 2724c.
Hawk owl, 4435b.
Hawksbill turtle, 5846a.
Hawk's nest, 6253b.
Haws, 2724d.
Hawthorn, 2724c.
Hawthorne, Julian, 2726c.
Hawthorne, Nathaniel, 2725b.
Hay, 2726d.
Hay, John, 2727c.
Hay asthma, 2734c.
Hay barn, 594c.
Hay-box, 2182d.
Hay-Chamberlain army bill, 3801b.
Hayden, F. V., 6391d.
Haydn, Josef, 2728a.
Hayes, Isaac I., 4727b.
Hayes, Rutherford Birchard, 2728b.
Hay fever, 2734c.
Hay grasses, 2577a.
Hay-Herran Treaty, 1480a.
Haymarket riot, 1316d, 1421a.
Hayne, Paul Hamilton, 2734b, 5816a.
Hayne, Robert Young, 2735a.
Hay-Pauncefote Treaty, 2735c.
Hays, Charles Melville, 2736a.
Haystack, Mount, 54a.
Hazards, 2530d.
Haze, 2736b.
Hazel, 2736c.
Hazel rods, 2736d.
Hazen, John Douglas, 2737a.
Hazen, William Babcock, 2737b, 5377c.
Hazing, 2737c.
Hazleton, Pa., 2737d.
Hazlitt, William, 2738a.
Head, 2738b.
Head, Sir Edmund Walker, 2738d.
Head, Sir Francis Bond, 2739b.
Headache, 2739d.
Head-dresses, 2661b, 4285a.
Header, Harvester, 4945d.
Head lettuce, 3390d.
Head louse, 3524c.
Head of fly, 2234b.
*Heads of Angels,* 4451.
Health, 2740b.
Health, Bill of, 718d.
Health, Board of, 785c.
Health habits, 2740c.
Healthy-mindedness, 3417d.
Hearing, 1323a; test of, 1900b.
Hearing of animals, 261a.
Hearn, Lafcadio, 2743c.
Hearne, Samuel, 1142c, 2743d.
Hearst, George, 2744b.
Hearst, Mrs. Phoebe, 243b, 1071a, 4074a.
Hearst, William Howard, 2744a.
Hearst, William Randolph, 2744b.
Heart, 1388b, 2744d.
Heartsease, 6129d.
*Heart's Ease,* 4478a.
Heart spasm, 255b, 2747b.
Heartwood, 5203d.
Heat, 2747c.
Heat equator, 3074a.
Heat exhaustion, 5630b.
Heat fever, 5630a.
Heat given off in work, 4316c.
Heath, 2750c.
Heath, Sir Robert, 4266b.
Heathcoat, John, 4293c.
*Heathen Chinee, The,* 2706d.
Heathen gods, 2518d.
Heather, 2750c.
Heather-bell, 781a.
Heather-mixture tweed, 5922c.
Heath family, 857a.
Heating and ventilation, 2751a.
Heat lightning, 3429b.
Heat of the sun, 5625a.
Heat prostrations, 169c, 5630a.
Heat values of fuel, 2346b.
Heaven, 2753c.
Heavens, map of, 444.
Heaves, 2753c.
Heavy artillery, 403b.
Heavysege, Charles, 1141b, 1143b, 2753d.
Hebe, 2753d.
Heber, Reginald, 2754a.
Hébert, Louise Philippe, 2754c.
Hebrew Book of the Law, 3639d.
Hebrew calendar, 1052b.
Hebrew idea of God, 2519a.
Hebrew language and literature, 2754c.
Hebrew manna, 3635b.
Hebrews, 3149a.
*Hebrews, Epistle to the,* 2756a.
Hebrew shekel, 5343b.
Hebrides, The, 2756a.
Hebron, Palestine, 2756d.
Hecate, 2757a.
Hecate Strait, 4899a, 5398:
Hecker, Thomas, 4530c.
Hecla, 2760a.
Hectograph, 2757b.
Hector, 2757c.
Hecuba, 2757d.
*Hedda Gabler,* 2902a.
Heddles, 6234a.
Hedgehog, 2757d.
Hedin, Sven Anders, 2758b.
Heel-fly, 864b.
Heenan, J. C., 4830c.
Hegel, George Wilhelm Friedrich, 2758c.
Hegira, 2066c, 2758d, 3872b.
Heidelberg, Germany, 2759a.
Heidelberg University, 2759b.
Height of Land, 1812b, 2596c.
Heights of the Volga, 5113d.
Heilprin, Angelo, 2759c.
Heimdall, 2759c, 4047b.
Heine, Heinrich, 2759c.
Heir, 2760a.
Heir apparent, 2760a.
Heirlooms, 2760a.
Heir presumptive, 2760a.
Heiser, Dr. Victor G., 3384d, 4635d.
Hejira, 2758d.
Hekla, or Hecla, 2760a.
Hektare, 3759a.
Hektoliter, 3759b.
Hel, 2760b, 4047b, 4051b.
Hele, Peter, 6211b.
Helena, Ark., 2760b.
Helena, Mont., 2760c.
Helena, Queen, 6077b.
Helen of Troy, 1219b, 2761a, 5887d.
Helgoland, 2761d.
Helichrysum, 2935a.
Helicon Range, 2762a.
Heliograph, 2762c, 5377d.
Heliographic chart, 1282a.
Heliopolis, Lower Egypt, 2763a.
Helios, 2763b.
Heliotrope (gem), 2763b.
Heliotrope (plant), 2763d.
Helium, 1294d, 1295c.
Helix, 6324c.
Hell, 2763d.
Hell diver, 2599d.
Helle, 2764a.
Hellebore, 2764a.
Hellenes, 2600d.
Heller, 1468b.
Hellespont, 1702c, 2764a.
Hell Gate and bridge, 2764b.
Helmet, 2764d.

Helmholtz, Hermann von, 2765a.
Héloïse, 8c.
Helots, 2765b.
Helsingfors, Finland, 2765b.
Helvetii, 2765c.
Hemans, Felicia Dorothea, 2765d.
Hematite, 2765d.
Hemerocallis, 1715c.
Hemiptera, 2766a, 3000d.
Hemisphere, 2766b.
Hemlein, Peter, 4312d.
Hemlock, 2766c.
Hemlock cone, 1529b.
Hemoglobin, 775c.
Hemp, 2767b, 3625a.
Hemp, Indian, 2711d.
Hemp-eaters, 427d.
Hemp fiber, 2160c.
Henderson, Ky., 2768b.
Hendricks, Thomas Andrews, 2768c.
Hen hawk, 1029c, 2540d, 2723d.
Henley, William E., 1721b.
Henna, 2660b.
Hennepin, Louis, 2768d.
Hennepin Canal, 2769a.
Henriques, Alfonso, 4782d.
Henry I, II, III, IV, V, VI, VII (England), 2769c.
Henry VIII (England), 1227c, 1625a, 2771a, 4960b.
Henry I, II, III, IV (France), 2772a.
Henry I of Lorraine, 2638b.
Henry III, IV, VI (Holy Roman Empire), 2772d.
Henry III, IV, VI (Germany), 2621c, 2773a.
Henry, Alexander, 1142b, 2773c.
Henry, Joseph, 2773d, 5736b.
Henry, Patrick, 2774b.
Henry de Montmorency, 3932a.
Henry the Lion, 961b.
Henry the Navigator, 2774d, 4783b.
Hen's balanced ration, 4802b.
Henschel, Georg, 2775a.
Henty, George Alfred, 2775b.
Hepatica, 2775c.
Hepplewhite, George, 2355b.
Heptameter, 3756a.
Heptarchy, 2775c.
Hepworth, Cecil M., 3987a.
Hera, 2780a, 3190a.
Heraclius, 1031d.
Herald, 2775d.
Heraldry, 2776a.
Herat, Afghanistan, 2777b.
Herbarium, 2777c.
Herbart, Johann Friedrich, 2777d.
Herbert, Victor, 2778c.
Herbicides, 6239b.
Herbs, 2778d.
Herculaneum, Italy, 2779a.
Herculano, 4781b.
Hercules, 2779c.
Hercules, Pillars of, 2781a.
Hercules beetle, 2781b.
Herder, Johann, 2521d.
Herd's grass, 5815c.
Heredity, 2781c.
Heresy, 2782b.
Herjulfson, Bjarni, 6088a.
Hermes (Mercury), 3744a.
Hermit, 2782d.
*Hermitage,* The, 3099a, 4071b, 5751d.
Hermit crab, 2782c.
Hermit kingdom, 1366b.
Hermit trail, 2560a.
Hermon, Mount, 4458d.
Hermopolis, Syra Island, 1679a.
Hernandez Y Aguilar, Gonzalo, 2533c.
Herne, James A., 2783a.
Hernia, 2783a.
Hernicans, 3342c.
Hero, 2783b.
Herod, 2783c.
Herod Agrippa I, II, 2784a.
Herod Antipas, 2783d.
Herodias, 2783d.
Herodotus, 2784c.
Herod Philip, 2784a.
Herod the Great, 2783c.
Heroic Age, 2604b.
Heroic drama, 1867c.
Hero Island, 6063b.
Heron, 2784d.
Hero of Alexandria, 5540a.
Hero of Manila, 1782c.
Herrera, Francisco, 2785c.
Herrick, Robert, 2785d.
Herrick, Robert [Welch], 2786a.
Herring, 2786b.
Herring gull, 2640c.
Herschel (family), 2787c.
Herschell Island, 5096a.
Hertburn, Sir William de, 6199c.
Hertz, Heinrich, 6325b.
Herzl, Theodore, 6413a.
Hespeler, Ont., 2787d.
Hesperia, 2788a.
Hesperides, 2788a.
Hesperus, 2106a, 6054a.
Hesse, Grand duchy of, 2788b.
Hessian fly, 2788d.
Hessians, 2789a.
Hessite, 5386b.
Hetch-Hetchy Valley, 1057d.
Heth, 2803a.
Hevea, 903b, 5097b.
Hewitt, Abram Stevens, 2789c.
Hewlett, Maurice Henry, 2789d.
Hexameter, 3756a.
*Hexateuch,* 4576b.
Heyse, Paul Johann, 2789d.
Hezekiah, 2790a.
*Hiawatha,* 229d, 2790b.
Hibben, John Grier, 2790c.
Hibbing, Minn., 2790d.
Hibernation, 2791a.
Hibernia, 2791c.
Hibiscus, 2791c.
Hiccough, 2791d.
Hichens, Robert Smythe, 248b, 2792a.
Hickory, 2792b.
Hicksite Quakers, 4884a.
Hidalgo, 3771b.
Hidden-veined leaves, 6047a.
Hide glue, 2515b.
Hierarchy, 2792d.
Hiero, 2579c.
Hieroglyphics, 2792d.
Higginson, Thomas Wentworth, 2794a.
High Church party, 1375b.
High Court of Justice, 2589a.
Higher barbarism, 1400b.
Higher civilization, 1401b.
Higher education, 1942c.
Higher savagery, 1399c.
Highest common factor, 2594d.
High-head water power, 6219a.
Highhole, 2209a.
High Knob, 4163b.
Highlands of Brazil, 5449b.
Highlands of Scotland, 2583d, 5258d.
High license, 3405d.
High mass, 3682c.
High Point, N. C., 2794b.
High priest, 2794b.
High River, 2795a.
High schools, 5240a.
High seas, 2795a.
High-speed telegraphy, 5735d.
High tension currents, 2003b.
High tide, 5808b.
Highway, 2795b, 5028a.
Highway robbery, 5033c.
Hiki, 3152b.
Hilkiah, 3138c.
Hill, 2795c.
Hill, David Bennett, 2795c.
Hill, David Jayne, 2795d.
Hill, Ellen, 4415b.
Hill, Isaac, 3261c.
Hill, James Jerome, 2796a.
Hillis, Newell Dwight, 2796c.
Hill of the Nymphs, 454a.
Hilo, Hawaii, 2721a.
Hilo Bay, 2719b.
Himalaya Mountains, 2796d.
Himalayan rabbit, 4907a.
Himation, 1860b.
Hincks, Sir Francis, 2797c.
Hind, 1739b.
Hindenburg, Paul von Beneckendorff und von, 2798a.
Hindu Kush Mountains, 2798c.
Hindu notation, 4291c.
Hindustan, 2798d.
Hinge joints, 3167b.
Hinnom, Valley of, 2411a, 3141b.
Hinterrhein, 4994a.
Hipparchus, 2798d, 4684a.
Hippias, 4684a.
Hippocampus, 2799a.
Hippocrates, 2799c.
Hippocrene, Fountain of, 2762b, 4550c.
Hippodamia, 4555c.
Hippodrome, 2799c.
Hippolyta, 222a, 2780b.
Hippolytus, 4616c.
Hippomenes, 450c, 4052d.
Hippopotamus, 2800a.
Hip roof, 5067b.
Hiram of Tyre, 1244d, 5435c; tomb of, 4644a.
Hirsch, Emil Gustav, 2801a.
Hirsch, Maurice, Baron de, 2801a.
Hispania, 5476d.
Histology, 2801b.
Historical grammar, 2556a.
History, 2801c.
History, Father of, 2142a.
*History of Plymouth Plantation,* 887d.
*History of the Decline and Fall of the Roman Empire,* 2490d.
Hither-Rhine, 4994a.
Hittites, 1091a, 2803a, 4643d.
Hives, 2803a.
Hivites, 1091a.
Hoang-ho, 2803b.
Hoar, George Frisbie, 2803c.
Hobal, 3872b.
Hobart, Tasmania, 2803d, 5709a.
Hobbema, Meindert, 2804a.
Hobbes, John Oliver, 1622b.
Hobbes, Thomas, 2804a.
Hobbism, 2804b.
Hobocan Hackingh, 2804d.
Hoboken, N. J., 2804b.
Hobson, Richard Pearson, 2804d.
Hochanka Indians, 6314d.
Hochelaga, 5157c.
Hockey, 2805b.
Hockey skate, 5398a.
Hocking River, 4354d.
Hocks, 4763d.
Hoder, 4047a.
Hoe, 2805d.
Hoe, Richard March, 2805d.
Hofburg, 6083c.
Hofer, Andreas, 2806a.
Hoffman, Matilda, 3067c.
Hofman, Josef, 2806a.
Hofmann, Heinrich, 4455a.
Hog, 2806b.
Hogarth, William, 2807a.
Hogback Mountain, 4101d.
Hogchoker, 5434b.
Hog Island, 4069c.
Hogshead, 2807a.
Hogues Hill, 4348a.
Hogweed, 4914c.
Hohenlinden, Battle of, 4064c.
Hohenstaufen, 2807b.
Hohenzollern (family), 2807c.
Hohenzollern Canal, 1148c.
Holbein (family), 2807c.
Holbert, Ludwig, 1758d.
Holden, Edward Singleton, 2808a.
Holder of a note, 4292c.
Holding corporation, 5891d.
Holiday, 2808a.
Holinshed, Raphael, 2808c.
Holland, 4122a.
Holland, John Philip, 2808d.

Holland, Josiah Gilbert, 2809b.
Holland, Mich., 2809c.
Holland gin, 5132b.
Hollands, 766c.
Holley, Myron, 3401c.
Hollis-Johnson Community Forum bill, 1518b.
Hollow Lacedaemon, 3292b.
Hollow relief, 4965a.
Holly, 2809d.
Hollyhock, 2810b.
Holmes, Elias Burton, 2810c; quoted, 3488a.
Holmes, Henry N., 3929b.
Holmes, Oliver Wendell, 229b, 2810b.
Holmes, Oliver Wendell, Jr., 2812b.
Holmium, 1294d.
Holofernes, 3180a.
Holoku, 2828b.
Holstein-Friesian cattle, 1235c.
Holston River, 5755c.
Holy Alliance, 2812c.
Holy Club, 6245d.
Holy Cross, Mount of the, 1491d.
Holy Eucharist, 5052a.
Holy Family, 2812d.
*Holy Family,* 4451.
Holy Grail, 2813a.
Holy Grail, Castle of the, 4515c.
Holy Land, 4458b.
Holy League, 2814a, 4691b, 5791b.
*Holy Night,* 4451.
Holy Office, 2997b.
Holy of Holies, 5673d.
Holyoke, Mass., 2814a.
Holyoke, Mount, 2814c.
Holy Orders, 5052b.
Holy Orthodox Church and Apostolic Church, 2610a.
Holy Place, 5673d.
Holy Roman emperor, 499b, 1277a, 2475c.
Holy Roman Empire, 1274a, 2814d, 2475c.
Holyrood castle, 1925a.
Holyrood palace, 2815b.
Holy spirit plant, 2815c.
Holy Thursday, 409a, 2815d, 3699d.
Holy tree, 2809d.
Holy wars, 1650d.
Holy water, 2815c.
Holy week, 2815d.
Homage, 2815d.
*Home,* 4533c.
Home canning club, 883d.
Home decoration, 3013d.
Home economics, 2816a.
Home for birds, 736a.
Home games, 2375b.
Home geography, 2429a.
Home-made toys, 5852c.
Home-making, 2816a.
Home of the blizzards, 4274a.
Home of the fur seal, 4815c.
*Home of the Heron,* 4451.
Homeopathy, 2820b.
Home-project method, 103c.
Homer, 2820d.
Homer, Louise, 2822a.
Homer, Sidney, 2822b.
Homeric simile, 5387c.
Home Rule, 2505a, 2822b, 3052b.
Homestake Mine, 760a.
Homestead, Pa., 2824a.
Homestead laws, 2824b.
*Home, Sweet Home,* 4533b.
Homicide, 2824d.
Homing pigeon, 1201a.
Hondon, Island of, 3115c.
Hondo reclamation project, 4173d.
Honduras, 2824d.
Hone, 2826b.
Honesdale, Pa., 4570a.
Honey, 2826b.
Honey badger, 4933a.
Honeybee, 648b.
Honeybloom, 1829c.
Honeycomb, 649d.
Honeycomb bag, 5106d.
Honey locust, sweet locust, or black locust, 2827a, 3482a.
Honeysuckle, 1499d, 2827a.
Honeysuckle clover, 1440a.
Hong-kiang, 5380c.
Hong-kong, 2827b.
*Honi soit qui mal y pense,* 2396b.
Honiton lace, 3290b.
Honolulu, Distances from, 2720a.
Honolulu, Hawaii, 2717b, 2828a.
Honor, 2828c.
Honor, Legion of, 3372c.
Honorius, 1031c.
Honors (in cards), 925a.
Honshiu, Island of, 3115c.
Hood, John Bell, 2830a.
Hood, Mount, 2830b, 4403b, 5036d.
Hood, Thomas, 2830b.
Hood Canal, 4866a.
Hooded crow, 1648d.
Hooded merganser, 3746a.
Hoodoo rocks, 5046b.
Hoogly River, 2865a.
Hoo-hoo, 3973b.
Hookah, 4681c.
Hooker, Joseph, 2830c.
Hooker, Mount, 2831a.
Hookey, 2805b.
Hookworm, 2831a, 3416a.
Hoopoe, 2831c.
Hoorn, 2836d.
Hoosac Mountains, 2618d.
Hoosac Tunnel, 2831d.
"Hoosier Poet," 5019b.
Hoosier State, 2950b.
Hoover, Herbert C., 6177a, 6306d.
Hopango, Lake, 5179c.
Hop clover, 1440a.
*Hope,* 4451.
Hope, Anthony, 2724b.
Hope Hall, 6115d.
Hop-hornbeam, 3062d.
Hopi, 2832a.
Hopi girl, color plate, facing 2962.
Hopkins, Mark, 2832d.
Hopkinson, Joseph, 2658c, 2833a.
Hopkinsville, Ky., 2833a.
Hop-merchant butterfly, facing 1022.
Hops, 2833c.
Hopscotch, 2834b.
Hoquiam, Wash., 2834d.
Horace, Quintus Horatius, 2835a.
Horace Mann of the South, 4260a.
Horatius, 2835b.
Horeb, Mount, 5389c.
Horehound, 2835c.
Horizon, 2835d.
Horizon glass, 5329a.
Hormuz Island, 4596c.
Horn, 2836b.
Horn (musical instrument), 2836a.
Horn, Cape, 2836d.
Hornbeam, 3062d.
Hornbill, 2837a.
Hornblende, 2837b.
Horned lark, 3335b.
Horned lizard, 2837c.
Horned pout, 1226c.
Horned toad, 2837c.
Hornell, N. Y., 2837d.
Hornets, 2838a, 6210d.
Horn Island, 5809c.
Hornless cattle, 1233c.
Horn quicksilver, 1073b.
Horn silver, 5386b.
Horoscope, 2838c.
Horse, 2838c.
Horse artillery, 403b.
Horseback riding, 5015a.
Horse-chestnut, 2842a.
Horse-chestnut bud, 976b.
*Horse Fair,* 4451, 6025b.
Horse fly, 2842b.
Horse Indians, 5361b.
Horse latitudes, 2842c.
Horse locomotive, 4919c.
Horsemint, 561b, 3838b.
Horse mushroom, 4014c.
Horse power, 792d, 2842c, 6219a.
Horse power in automobiles, 516c.
Horse racing, 4908c.
Horse-radish, 2843c.
Horseshoe arch, 319a.
Horseshoe Bend, 216d.
Horseshoe Bend dam, 618b.
Horseshoe crab, 2843d.
Horseshoe Falls, 4224b.
Horseshoe tradition, 5634c.
Horse stable, 594c.
Horsetail mushroom, 4014d.
Horsetail rush, 2844a.
Horseweed, 2207a.
Hortensia, 2885a.
Horticulture, 2844b.
Horus, 3070c, 4419c.
Hosea, 2844d.
*Hosea, Book of,* 2844d.
Hosmer, Harriet, 2844d.
Hospital, 2845a.
Host (biology), 4490a.
Hostage, 2847b.
Hot-air furnace, 2751d.
Hotbed, 2847c.
Hotchkiss, Benjamin, Berkely, 3563a.
Hotchkiss gun, 3563a.
Hotel, 2847d.
Hotel des Invalides, 3024d.
Hothouse, 2617c.
*Hot or Cold* (game), 2378a.
Hot-pack method of canning, 2247d.
Hot spark, 6323b.
Hot springs, 3818d, 5785d, 6389c.
Hot Springs, Ark., 2848c.
Hot Springs Reservation, 4504d.
Hottentots, 2849a.
Hot water heat, 2752a.
Houdin, Robert, 1541d.
Houdon, Jean Antoine, 2849b.
Houghton gooseberry, 2536b.
Hound, 2849c.
Hourglass, 2849d.
Housatonic dam, 1773c.
Housatonic River, 2850c.
House drain, 5321d.
Household arts in education, 2850b.
House in the Wood, 2657b.
Houseleek, 2852d.
House martin, 3668a.
House mice, 3983b.
House of Braganza, 4783c.
House of Commons, 1515c, 2588c, 4508a
House of Commons mace, 3558b.
House of Destruction, 6419b.
House of Everlasting Fire, 3238b.
House of Hohenzollern, 4854d.
House of Hymns, 6419b.
House of Lords, 2588b, 4508c.
House of Peers, 3120d.
House of Representatives, 4973d.
House of Representatives mace, 3558b.
House of Stuart, 5594b.
House of Valois, 6023d.
House of York, 6395b.
House snake, 3805a.
House sparrow, 5482a.
House wren, 6361d.
Houston, Sam, 2853a.
Houston, Tex., 2853c.
Hovas, 3578a.
Howard, Catharine, 2771c.
Howdah, 2006c, 5810d.
Howe, Elias, 2854a.
Howe, Joseph, 2854c, 5903a.
Howe, Julia Ward, 2855c.
Howe, Richard, 2855d.
Howe, Sir William, 2856a, 4987d.
Howell, Clark, 2856b.
Howells, William Dean, 2856c.
Howitzer, 403c, 405b, 2857a, 5363b.
Howlers, 2857b.

How to build an ice yacht, 2907a.
How to choose a story, 5564d.
How to make a booklet, 2975d.
How to read, 4938b.
How to tell a story, 5565c.
Hrolf, 4247d.
Huascar, 450b, 4693a.
Huayna Capac, 2936d.
Hubbard, Elbert, 2857c.
Hubbard squash, 5516c.
Hubertsburg, Peace of, 5320a.
Hub of the universe, 2811d.
Huckleberry, 2858a.
Huckleberry Finn's home, 3859c.
Huddersfield, England, 2858c.
Hudson, Henry, 2858d, 4279a, 4570c.
Hudson, Jeffery, 1890d.
Hudson, N. Y., 2859a.
Hudson Bay, 2859c.
Hudson Bay Railroad, 2860a, 4916b.
Hudson Hope, 4537b.
Hudson River, 2860b.
Hudson River skate, 5397d.
Hudson River tunnels, 2861b.
Hudson's Bay Company, 1121a, 2861d, 4280d.
Hudson seal, 4037a.
Hue (in color), 1483c.
Hue, Annam, 2862c.
Huerta, Victoriano, 2862c, 3579c, 3772c.
Huggins, Sir William, 4108a.
Hugh Capet, 2863b.
Hugh Conway, 2136c.
Hughes, Charles Evans, 2863b.
Hughes, James Laughlin, 2863d.
Hughes, Sir Richard, 4113d.
Hughes, Lieutenant-General Sir Sam, 2864b.
Hughes, Thomas, 2864d.
Hugh Town, Saint Mary Island, 5254b.
Hugli River, 2865a.
Hugo, Victor Marie, 2865b.
Huguenots, 2866b, 4959d.
Hull, England, 2867b.
Hull, Howard, 256d.
Hull, Que., 2867a.
Hull, William, 2867c.
Hull House, 2867d.
Human anatomy, 245b.
*Human Comedy, The,* 566b.
Human energy, Distribution of, 1430a.
Humane societies, 2868b.
Human geography, 2428a.
Human Period, 2868d.
Humber River, 2869a.
Humbert I, 2869a.
Humblebee, 653c.
Humboldt, Alexander, Baron von, 2869c.
Humboldt, Sask., 2869b.
Humboldt Current, 4443a.
Humboldt Glacier, 331c.
Humboldt Range, 4134a.
Humboldt River, 2870a.
Hume, David, 2870a.
Humerus, 372c, 5399d.
Humidity, 2105c, 2870b.
Humming bird, 2870d.
Humming-bird flower, 2504a.
Humming-bird moth, 2724b.
Humpback, 6273d.
Humperdinck, Engelbert, 2871c.
Humphreys, West H., 2936a.
*Humpty Dumpty,* 3316c.
Humus, 3471d, 5431d.
Hundred Days, The, 1975b.
Hundred Falls, 4396d.
Hundred Years' War, 2871d.
Hungarian accent, 4840d.
Hungarian millet, 3807d.
Hungarian partridge, 4519c.
Hungarian Reformed Church, 4961c.
Hungary, 2872a.
Huns, 2875a.
Hunt, Edward B., 3099b.
Hunt, Helen Fiske, 3099a.
Hunt, [James Henry] Leigh, 2875b.
Hunt, Mary Hanchett, 2875c.
Hunt, Richard Morris, 2875d.
Hunt, William Holman, 4809d.
Hunt, William Morris, 2876a.
Hunter, Gordon, 2876b.
Hunter, William, 2019c.
Hunter Mountain, 1231d.
Hunting leopard, 1292b.
Huntingdon willow, 6296c.
Huntington, Ind., 2876b.
Huntington, W. Va., 2876c.
Huntley project, 3905d.
Huntsman, The, 835d.
Huntsman's cup, 4684c.
Huntsville, Ala., 2877a.
Huntsville, Ont., 2877a.
Hunyadi-Janos water, 3818d.
Hunyady, 2873a.
Hurdling, 2877c.
Hurdy-gurdy, 2683a.
Huron, Lake, 2596a, 2878a.
Huron Indians, 2877d.
Hurricane, 2878c.
Hurricane at Galveston, 2371b.
Hurricane months, 4773d.
Husband, Support and earnings of, 2879d.
Husband and wife, 2879a.
Husband's liability, 2879d.
Huss, John, 2880c.
Hussain, 5816b.
Hussar, 2881a.
Hussein Kâmil, 1972d.
Hussites, 2881b.
Hutchinson, Anne (colonial), 2881c, 4999b.
Hutchinson, Kan., 2882a.
Hutchinson, Mary, 6357d.
Hutchinson, Thomas, 2881d.
Hutuku, 3889b.
Huxley, Thomas Henry, 2882b.
Huyghens, Christian, 5220a.
Hyacinth, 2882c.
Hyacinth bulb, 989d.
Hyades, 4707a.
Hyatt, Anna Vaughn, 3153d.
Hybrid, 2883c.
Hyde Park, London, 3490b.
Hyderabad, India, 804b, 2883d, 3588b.
Hydra, 2884a, 4746c.
Hydrangea, 2884c.
Hydrates, 2885a.
Hydraulic cement, 1249a.
Hydraulic engine, 2885b.
Hydraulic lime, 3434a.
Hydraulic press, 2885c.
Hydraulic ram, 2886a.
Hydraulics, 2886c.
Hydroaëroplane, 2887c.
Hydrocarbons, 2887c.
Hydrocyanic acid, 4856a.
Hydroelectric Commission of Ontario, 4384a.
Hydrofluoric acid, 2888a.
Hydrogen, 464a, 2888b.
Hydrogen chloride, 2888d.
Hydrogen dioxide, 2889a.
Hydrogen peroxide, 2889a.
Hydrogen sulphide, 5621a.
Hydrography, 2889b.
Hydrometer, 2889b.
Hydrophobia, 2889c.
Hydroplane, 2887c.
Hydrosphere, 1903a.
Hydrostatic press, 2885c.
Hydrostatics, 2890a.
Hydrosulphuric acid, 5621a.
Hydrotherapy, 2890c.
Hydroxides, 2885a.
Hydroxyl, 2885a.
Hyena, 2890d.
Hygeia, 2891a.
Hygiene, 2891b, 3409d.
Hygiene in schools, 4659c.
Hygiene of education, 1944a.
Hygiene of nerves, 4121b.
Hygrometer, 2892c.
Hyksos, 2893b.
Hymen, 2893c.
Hymenoptera, 647b, 2893c, 3000d.
Hymettus, Mount, 2604a.
*Hymn of Hate,* 2466a.
Hymns, National, 2893c.
Hymns and hymn tunes, 2894a.
*Hymn to the Sea,* 4442d.
Hyndman Peak, 2910c.
Hypatia, 2896b.
*Hypatia,* 3258c.
Hyperion, 2896c
Hypertrophy, 2747c.
Hypnotic, 4069a.
Hypnotism, 2896c.
Hypocotyl, 2482d.
Hypodermic injection, 2899c.
Hypoglossal nerves, 4121b.
Hypotenuse, 5876a.
Hypotheses, 2445a.
Hyssop, 2899c.
Hysteria, 1948a, 2899d.

# I

I, 2900a.
Iambic meter, 3755d.
Ian MacLaren, 6223c.
Iapetus (astronomy), 5220a.
Iapetus (mythology), 4836c.
Iberia, 2900b, 5476d.
Iberville, Pierre le Moyne, Sieur d', 2900b.
Ibex, 2901a.
Ibis, 2901b.
Ibrahim Pasha, 309d.
Ibsen, Henrik, 2901c.
Ice, 2902b.
Ice, in erosion, 2074b.
Ice Age, 2499a.
Iceberg, 2903d.
Iceberg Lake, 2503a.
Ice boating, 2906d.
Ice formation in Arctic Lands, 331c.
Ice hockey, 2805c.
Iceland, 2904d.
Iceland moss, 2906c.
Iceland poppy, 4760c.
Iceland spar, 2906c, 4731a.
Ice-making machine, 2903b.
Ice yachting, 2906d.
*Ich dien,* 1628d.
*Ich-line,* 4703c.
Ichneumon, 2907c.
Ichneumon fly, 2908a.
Ichthyosaurus, 2908c.
Iconoclasts, 2908d.
Icterus, 3126b.
Ida, Mount, 4499b.
Idaho, 2909a.
Idaho, University of, 2916a.
Idaho white pine, 4677d.
Ideal feelings, 2149d.
Ideographic writing, 2793a.
Ides, 2916c, 3931c, 4245d.
Idiom, 2916c.
Idiom neutral, 3325d.
Idiot, 2916c.
Idol, 2916d.
Idyll, 2917b.
*Idylls of the King,* 2917c, 2813b.
*If I Should Die To-Night,* 4512b.
Igloo, 2076a.
Ignatius, Saint, 2918a.
Ignatius of Loyola, 3143c, 3529a.
Igneous fusion, 3817c.
Igneous rocks, 2435c, 2436c, 2918a.
Ignis fatuus, 2918a.
Igorrote, 2918b, 4631b.
Iguala, Plan of, 3088a.
Iguana, 2918d.
Iguanodon, 1798b, 2919a.
Iguazú, Falls of, 5450b.
Ij, 6378b.
Ik Marvel, 3865b.
Ile de France, 3700b.
Ileum, 7d, 1796d.

Ilex, 4323d.
Iliac arteries, 391a, facing 1388.
*Iliad*, 2919b, 5887a.
Ilium, 5887a.
Illampu, Mount, 249c.
Illecillewaet glacier, 4506b, 5297c.
Illecillewaet River, 4981a.
Illimani, Mount, 249c.
Illington, Margaret, 2920a.
Illini, 2929b.
Illinois, 2920b.
Illinois, University of, 2929d.
Illinois and Michigan Canal, 2930c.
Illinois and Mississippi Canal, 2769a.
Illinois Indians, 2929d.
Illinois River, 2930d.
Illiteracy, 2931b.
Illiteracy Commission of Kentucky, 5247d.
Illiteracy in the Americas, 1939c.
Illuminating gas, 2401b.
Illusion, 2671b, 4583c.
Illustrative myths, 4044b.
Illyricum, 477d.
Iloilo, P. I., 2932c.
Image formed by a mirror, 4957a.
*Imaginary Verses of Alexander Selkirk*, 5297a.
Imagination, 2932c, 3728c.
Imago, 1023b, 3752c.
Imam, 4375c.
Imamat of Muscat, 4375c.
Imam Reza, Shrine of, 3749b.
Imatra Falls, 2176b.
Imitation, 6288a.
Imitation furs, 2352d.
Imitation gems, 2413d.
*Imitation of Christ*, 5794d.
*Immaculate Conception*, facing 4008, 4451.
Immigration, 2023c.
Immigration problem, 2025b.
Immortality, 2934d.
Immortelle, 2935a.
Immovable joints, 3167a.
Immunity, 2935a.
Imp, 2087d.
Impeachment, 2935b.
Imperative mode, 3870c.
Imperative sentence, 5303d.
Imperator, 2026d, 2936b.
*Imperator*, The, 1339d, 5353d.
Imperial bushel, 1014d.
Imperial City, 4551d.
Imperial Copyright Act, 1575d.
Imperial de Sant-Angelo, 3911a.
Imperialism, 2936b.
Imperial Oil Company, Ltd., 5523b.
Imperial Order of the Daughters of the Empire, 6349d.
Imperial Valley, 1062a, 5961c.
Implied contract, 1563c.
Importance of plants, 4697d.
Imposition, 4823c.
Impressionist school of painting, 2936c.
Impressment of American seamen, 6141c.
Imprisonment for debt, 1724d.
Improved Order of Red Men, 2318d.
Inarching (grafting), 2551c.
In bond, 808d.
Inca Indians, 2936d, 4602a.
Incandescent light, 1989c.
Incense, 2937a.
Inchcape Rock, 3426b.
Incidence, Angle of, 4957a.
*Incident of the French Camp*, 4942b.
Incisors, 5728c.
Inclined plane, 2937b, 3714c.
Income tax, 1561b, 2937d.
Incomplete metamorphosis, 3752c.
Incorrodible ink, 2995b.
Incubator, 2940a.
Incus, 1898d, 1899b.
Indefinite pronouns, 4838d.
Independence, Declaration of, 1735a.
Independence, Kan., 2940a.
Independence, Mo., 2940b.
Independence day, 2940c.
Independence day program, 2941a.
Independence Hall, 4621d, facing 4624.
Independent Order of Foresters, 2263d, 2319a.
Independent Order of Odd Fellows, 4341a.
Independent treasury, 4740d, 6028d.
Indeterminate gender, 2415c.
Indeterminate sentence, 1636d, 1639c, 2941c.
*Index Expurgatorius*, 2941d.
Index glass, 5329a.
India, 2942a.
India ink, 2950c.
Indiana, 2950b.
Indiana Dune Park, 1881a.
Indianapolis, Ind., 2959b.
Indiana Territory, 2703b.
Indiana University, 2961a.
Indiana Village for Epileptics, 4149d.
Indian bean, 1223a.
*Indian Bible*, 4824c.
Indian buffalo, 1234c.
Indian burial (color plate), facing 2962.
Indian chinkara, 2410c.
Indian corn, 1584c.
Indian day, 2970a.
Indian dipper, 4684c.
Indian elephant, 2006a.
Indian fig, 1039c, 4816b.
Indian Head, Sask., 2961b.
Indian hemp, 1829d, 2711d.
Indian mallow, 2961c.
Indian mythology, 2961c.
Indian Ocean, 2961d.
Indian paint, 777b.
Indian peach, 4538c.
Indian pickle, 4662a.
Indian pink, 1183c.
Indian pony, 2841c.
Indian pueblo, 4864a.
Indian reservations, 2970a.
Indian rhinoceros, 4994d.
Indian rice, 5008a.
Indian root, 5499a.
Indians, American, 2962a.
Indians of Mexico, 3766b.
Indian sorrel, 5443b.
Indian spear, 5486b.
Indian summer, 2971a.
Indian Territory, 2971a.
Indian tiger, 5810b.
Indian tobacco, 3472b.
Indian turnip, 3092c.
India paper, 830c.
India rubber, 2971d.
Indicated horse power, 2842d.
Indicative mode, 3870b.
Indicolite, 5849a.
Indictment, 2971d.
Indies, 1910b.
Indigo, 2972a.
Indigo bird, 2972c.
Indigo bunting, 2972c.
Indigotin, 2972c.
Indirect radiation, 2751b.
Indirect taxes, 5712b.
Indium, 1294d.
Indo-African realm, 6416a.
Indo-China, 2972d.
Indo-European languages, 3314b.
Indo-European races, 4909c.
Indoor baseball, 608d.
Indris lemur, 3379b.
Induction, Electric, 2973a.
Induction coil, 2973b, 6321b.
Inductive method, 2973c, 3486a.
Indulgence, 2974a.
Indurite, 5417c.
Indus River, 2974a.
Industrial arbitration, 315a.
Industrial art, 2974b.
Industrial bounties, 867c.
Industrial chemistry, 1298b.
Industrial demands of Socialism, 5425c.
Industrial education, 5727c.
Industrial expositions, 2115c.
Industrial school, 2987a.
Industrial training, 6108b.
Industrial Workers of the World, 940c, 3286b, 5136a, 5669c.
Industries, 2987a.
Industry and vocational guidance, 6106b.
Inertia, 2987c.
Infant baptism, 586d.
Infantile paralysis, 2987d.
Infant mortality, 2988d.
Infantry, 2989c, 5677b.
Infantry division, 380a.
Infantry regiment, 4962a.
Infections, 3415c.
Inferior courts of the United States, 5639d.
Inferior maxillary, 2738d.
Infinitive, 2990b.
Infinitive in *ing*, 4518a.
Inflammatory rheumatism, 4993a.
Inflated currency, 3886d.
Inflation bill, 2570c.
Inflection, 2991a.
Inflectional languages, 4640c.
Inflorescence, 2991b.
*Influence of Sea Power on History*, 3597c.
Influenza, 2991c.
Infusoria, 2991d.
Ingalls, John James, 2991d.
Ingeborg of Denmark, 4628d.
Ingelow, Jean, 2992a.
Ingersoll, Ont., 2992b.
Ingersoll, Robert Green, 2992c.
Ingraham, Duncan N., 4668a.
Inheritance tax, 2992c.
Inhibition, 6287c.
Initiative and referendum, 2993a.
Injector, 2994b.
Injunction, 2994d.
Ink, 2995a.
Inkberry weed, 4722d.
Inky-cap mushroom, 4015d.
Inland fisheries in Canada, 1107d.
Inlays, 3960c.
Inlet manifold, 515c.
*In loco parentis*, 4492d.
Inner City, Peking, 4551d.
Inner tube of tire, 4715c.
Inness, George, 2995c.
Innkeepers, 2848b.
Innocent (Popes), 2996a.
Innocents, Feast of Holy, 2996c.
Innocents' day, 2996c.
Innocent tumor, 5900a.
Innominate artery, 7c.
Innominate vein, facing 1388.
Inn River, 5659c.
Innsbruck, Austria, 2996d.
Innuit, 2075b.
Inoculation, 2997a.
Inokami, Lake, 5828c.
Inquisition, 2997b.
Insane asylums, 2998b.
Insanity, 2997d.
Inscription of coin, 4311c.
Inscription Rock, 4354d.
Inscriptions and Belles Lettres, Academy of, 3003d.
Insect, 2999a.
Insect cages, 4084c.
Insect-eating plants, 858c.
Insecticides and fungicides, 3001b.
Insectivora, 3002d.
Insect pests, 96c, 298d.
Insects as pollen carriers, 4743a.
Insect study, 4088a.
Insensible perspiration, 4599b.
Insignia, 5939b.
Insomnia, 3003a.
Inspiration, 3537b.
Instinct, 260b, 3003a.

Institute of France, 3003c.
*Institutio Oratorio*, 4903d.
Instruction, Order of, 4547c.
Instrument of credit, 1629a.
Insulation of aërial, 6323b.
Insulator, 1674d, 3003d.
Insurance, 3004a.
Insurance, Hail, 2658b.
Insurance, in arithmetic, 3006b.
Intaglio, 1079d, 2413c, 3007b.
Intaglio photo-engraving, 4648c.
Intelligence, The measurement of, 3007b.
Intelligence of animals, 260a.
Intelligence tests, Uses of, 3009a.
Intendant, 2343c.
Intensity of light, 3423d.
Intensity of sound, 5444c.
Intensity of tones, 4021c.
Intensive farming, 415c, 3009d.
Intercardinal points, 1520d.
Intercolonial railways, 1111d.
Intercostal rheumatism, 4993b.
Interest (business), 3010c.
Interest (economics), 1172c, 3011c.
Interest (psychology), 3012c, 3729d.
Interior, Department of the, 3013c.
Interior decoration, 3013d.
*Interior of a Cottage*, 4451.
Interjection, 3016c.
Interlaken, Scotland, 3017a.
Interlocutory injunctions, 2994d.
Interlocutory judgment, 3180a.
Intermezzo, 3017a.
Intermittent fever, 2159c.
Intermittent springs, 5509a.
Intermontane valleys, 6022c.
Internal-combustion engine, 2402a.
Internal ear, 1899b.
Internal parasites, 4490a.
Internal revenue, 3017b.
Internal revolution, 4983a.
International African Association, 1534c.
International arbitration, 315b.
International boundary, 3310c.
International bureau of weights and measures, 3760b.
International carat, 3759c.
International code, Signaling, 5378a.
International Committee for the Relief of the Wounded in War, 4951a.
International Congress of Thrift, 5802c.
International copyright, 1576a, 2700b.
International date line, 3018d.
International Harvester Company, 3553b, 3894b.
Internationalism, 3021c.
International law, 3019b.
International meter, 3756a.
International money orders, 4791d.
International News Service, 430c.
International Order of Good Templars, 2534b.
International Peace Conference, 4535b.
International Postal Union, 4789a.
International quarantine, 4884c.
International Socialist party, 5426b.
International relations, 3021c.
International Workingmen's Association, 3286b.
Internes, 2845c.
Internuncios, 4312c.
Interrogation point, Use of, 4871a.
Interrogative pronouns, 4837d.
Interrogative sentence, 5303d.
Interrupter, 2973b.
Interrupter for wireless telegraphy, 6323c.
Interstate Commerce Act, 1420c, 3022c.
Interstate Commerce Commission, 3023b.
Intervals, Musical, 4031b.
Intervention, 3023d.
Intestacy, 3023d.
Intestine, 201b, facing 1388, 1796d, 3024a.
Intolerable acts, 3024c.
Intoxicating beverages, 168a, 3415b.
Intrados, 318c.
Intransitive verbs, 6056b.
Invalides, Hotel des, 3024d.
Invention, 3025a.
Inverness, Cape Breton Island, 3029b.
Invertebrates, 3029b.
Inverted order of the sentence, 5304b.
*Invincible Armada*, 373a, 1851c.
Invitation, Acceptance of, 3390a.
Involuntary acts, 4957b.
Involuntary bankruptcy, 575b.
Involuntary manslaughter, 3636d.
Involuntary muscles, 4011c.
Involution, 3030a.
Io, 3030c.
Iodides, 3031b.
Iodine, 3030d.
Iodoform, 3031c.
Iola, Kan., 3031c.
Iolcus, 5789c.
Iole, 2780d.
Ion, 2000b, 3031d.
Ionia, 3032a.
Ionian Islands, 3032b.
Ionians, 3032c.
Ionian Sea, 3032d.
Ionic column, 1507d.
Ionic School of Philosophy, 4641c.
I. O. U., 3032d.
Iowa, 3033a.
Iowa, University of, 3042a.
Iowa City, Ia., 3042c.
Iowa Indians, 3042a.
Iowa standard of handwriting, 1937b.
Iowa State College of Agriculture and Mechanic Arts, 3043a.
Ipecac, 3043b.
Iphigenia, 3043c.
Ipsus, Battle of, 4880a.
Irak-Arabi, 532b.
Iran, 3043d.
Iranian languages, 3044a.
Iranians, 3043d.
Irawadi River, 3063d.
Ireland, 3044a.
Ireland, John, 3054c.
Ireland and Home Rule, 2823b.
Irene, Empress, 1032a, 4229b.
Iridium, 3054d.
Iris (eye), 2118b.
Iris (mythology), 3054d.
Iris (plant), 3055a.
Iris bud, 976b.
Irish bulls, 3753a.
Irish greyhound, 2625c.
Irish lace, 3290c.
Irish Land League, 4511c.
Irish literature, 3055b.
Irish lord, 5271d.
Irish moss, 3056c.
Irish players, 3056b.
Irish potato, 4793c.
Irish Sea, 3056d.
Irish setter, 5317b.
Irish terrier, 5763d.
Iris root, 4415d.
Iritis, 769b.
Irkutsk, Siberia, 3056d.
Iron, 3057a.
Iron Age, 3061b.
Iron as medicine, 3719d.
Iron beam bridges, 922a.
Iron Chancellor, 753b.
Iron Cross, 3061c.
Iron Crown of Lombardy, 1273c, 1650a.
Iron Czar, The, 4229a.
Iron Gate, 1700b.
Iron Mask, The Man with the, 3062a.
Iron Mountain, 3062b.
Iron Mountain, Mich., 3062b.
Iron ore, 3057c, 3059c.
Iron pyrite, 4879d.
Iron rust, 5128c.
"Ironsides," 1643b.
*Ironsides, Old*, 1558b.
Iron sulphate, 5620a.
Ironton, O., 3062c.
Ironwood, 3062d.
Ironwood, Mich., 3063a.
Irony, 3063b.
Iroquoian Indians, 3063b.
Irregularities in number, 4310b.
Irregular verbs, 6056d.
Irrigation, 1343b, 3064a.
Irrigation in Arizona, 357d.
Irrigation projects, United States, 5960c.
Irrigation well of Palestine, 4459d.
Irritants, 4721c.
Irtish Bridge, 5862b.
Irving, Sir Henry, 3066d.
Irving, Washington, 3067a.
Irvington, N. J., 3068c.
Isaac, 3068c.
Isabella of Castile, 3069b.
Isaiah, 3069c.
*Isaiah, Book of*, 3069d.
*I Saw* (game), 2375b.
Ischia Islands, 4062c.
Isel Mountain, 2997a.
Ishikari River, 3118c.
Ishmael, 3069d.
Ishmaelites, 3070a.
Ishpeming, Mich., 3070a.
Ishtar, 434c.
Isinglass, 3070a, 3778b.
Isis, 3070c.
Islam, 3070d, 3871d, 3873b.
Island, 3070d.
Island Range, 6032d.
Isle de los Estados, 5809c.
Isle La Motte, 6063b.
Isle of Pines, 3072b.
*Isle of the Blessed*, 4451.
Isle of Wight, 6282a.
Isle Royale, 3072c.
Isle Saint Ignace, 4380a.
Isle Saint Jean, 4821a.
Ismail Pasha, 1970c.
Ismarus, 4343b.
Ismene, 4344b.
Isobars, 3072d, 6320d.
Isocrates, 3073a.
Isola Sacra, 5805b.
Isolating languages, 4640c.
Isolation, Doctrine of, 3901b.
Isoptera, 3000d.
Isosceles triangle, 5876a.
Isothermal lines, or isotherms, 3073b, 6231b.
Isothermal map, 1432b.
Ispahan, Persia, 3074a.
Israelites, 3149a.
Israels, Josef, 3074b.
Istakhr, Persia, 4591a.
Isthmian games, 3074c.
Isthmus, 3074c.
Isthmus of Corinth, 1580d.
Isthmus of Panama, 4470d.
Itaboca, Falls of, 5827a.
*Italia irredenta*, 507b.
Italian accent, 4840c.
Italian army, 385a.
Italian clover, 1440a.
Italian language, 3074d.
Italian national hymn, 2984a.
Italian sculpture, 5274a.
Italian Somaliland, 5439a.
Italy, 3075b.
Italy, Flag of, 2199a.
Itasca, Lake, 3851a.
Itch, 3086d.
Itchinskaya, Mount, 3200d.
Itch mite, 3866d.
Ithaca, Island of, 3087a.
Ithaca, N. Y., 3087b.

Ito, Hirobumi, Marquis, 3087d.
Itorup Island, 3281c.
Iturbide, Augusta de, 3088a, 3771c.
Ivan III, the Great, 3088b.
Ivan IV, the Terrible, 3088c.
Iverson, Alfred, 5986d.
Ivory, 3088c.
Ivory-billed woodpecker, 6352d.
Ivory black, 810a.
Ivory carving, 1210d, 3089a.
Ivory Coast, 3089c.
Ivory palm, 3089d, 4463a.
Ivry, Battle of, 2772c.
Ivy, 3090c.
Ivy-leaved geranium, 2462b.
Iyeyasu, 3122b.
Iztaccihuatl, Mount, 3767d.
Izzard, 6407c.

# J

J, 3091a.
Jabiru, 3091a, 5562d.
Jacana, 3091b.
Jackal, 3091d.
Jackboot, 838b.
Jackdaw, 3092b.
Jacket (cannon), 404d.
Jack-in-the-box crab, 2782d.
Jack-in-the-pulpit, 3092c.
Jack rabbit, 2689a, 4906b.
Jack salmon, 4584a.
Jacksaw, 5270c.
Jacksnipe, 5421a.
Jackson, Amelia Lee, 2811c.
Jackson, Andrew, 3092b, 4177c.
Jackson, Charles T., 3960b.
Jackson, Helen Fiske Hunt, 3099b.
Jackson, Mich., 3100b.
Jackson, Miss., 3100d.
Jackson, Tenn., 3101a.
Jackson, Thomas Jonathan, 3099c.
Jackson, William S., 3099b.
Jackson Monument, New Orleans, 3517a.
Jacksonville, Fla., 3101c.
Jacksonville, Ill., 3102a.
Jackstones, 3102c.
Jackstraws, 3102d.
Jacob, 3102d.
Jacobins, 3103a.
Jacobites, 3103b.
Jacquard, Joseph Marie, 3103c.
Jacquard loom, 6234a.
Jade, 3103c.
Jael, 1724a.
Jaffa, Palestine, 3103d.
Jagellon dynasty, 4724a.
Jaggery, 4462d.
Jagts, 4286a.
Jaguar, 3104a.
Jahn, Friedrich Ludwig, 3104c.
Jail fever, 5932d.
Jaipur, India, 3105a.
Jalap, 3105a.
Jamaica, 3105b.
Jamaica Bay, 4206a.
Jamaica coffee, 1464c.
Jamaica pepper, 207d, 4579a.
James, Charles Canniff, 3108a.
James, Edmund Janes, 3108b.
*James, Epistle of,* 3109b.
James, Henry, 3108c.
James, Saint (the Greater), 3109a.
James, Saint (the Less), 3109b.
James, Thomas, 5101d.
James, William, 3109c.
James I, II (England), 3107b.
James Ballantyne & Company, 5268a.
James Bay, 3109d.
James engine, 4919b.
Jameson, Leander Starr, 3110a.
James River (N. D.), 4270a.
James River (Va.), 3110b.
Jamestown, N. Y., 3111a.
Jamestown, Va., 3110b.
Jamoo, India, 3215c.
Janesville, Wis., 3111c.
Janiculum Hill, 5064b.
Janina, Greece, 2064d.
Janizaries, 3111d.
Jan Mayen, Island of, 4726c.
Janssen, Zacharias, 3792b.
January, 3114a.
Janus, 3114d.
Japan, 3115a.
Japan (varnish), 6038c.
Japan Current, 3124c.
Japanese baby carriage, 417a.
Japanese maples, 3643b.
Japanese national hymn, 2894a.
Japanese persimmon, 4597a.
Japanese spaniel, 5479d.
Japanese titmouse, 5821c.
Japanning, 3124d.
Japan stream, 4334b.
Japan Treaty, 4589d.
Japan varnish tree, 5622b.
Japheth, 3125a.
Japonica, 1079d.
Jardin des Plantes, 4495d.
Jaredites, 3951a.
Jasmine, 3125b.
Jason, 2527a, 3125d, 3715c.
Jasper, 3125d.
Jasper Park, 157a, 4506b.
Jasper ware, 6237d.
Jassy, Rumania, 5105d.
Jaundice, 3126b.
Java, 3126a.
Java and Madura, 1910c.
Java coffee, 1464c.
Javanese plows, 4709a.
Java sparrow, 5007b, 6232d.
Jay, 3127b.
Jay, John, 3127d.
Jay Eye See, 4908d.
Jay Fort, 2548b.
Jayhawker State, 3203a.
Jay Treaty, 3128b.
Jeanne d'Arc, 3152d.
"Jean Paul," 5013c.
Jeassu, 17b.
Jebel Ayashi, 463d.
Jebel Makmal, 3364a.
Jebel Neba, 4100c.
Jebstun Hutuku, 3889b.
Jebusites, 1091a, 3141d.
Jefferson, Joseph, 3128d.
Jefferson, Mount, 4403b.
Jefferson, State of, 5774d.
Jefferson, Thomas, 1753a, 3129a.
Jefferson Barracks, 5159b.
Jefferson City, Mo., 3125c.
Jefferson Highway, 3860d.
Jeffersonville, Ind., 3136a.
Jeffreys, George, Lord, 3136b.
Jeffries, James J., 4830c.
Jehoram, 3136d.
Jehoshaphat, 3136c.
Jehovah, 3136d.
Jehu, 3136d.
Jejunum, 7d.
Jellicoe, Sir John Rushworth, 3137a.
Jelly, 3137b.
Jellyfish, 3137c.
Jena, Battle of, 3137d.
Jena, Germany, 3137d.
Jenever, 2494d.
Jenghis Khan, 2418c.
Jenil River, 2558a.
Jenks, Jeremiah Whipple, 3137d.
Jenner, Edward, 3138a.
Jerboa, 3138b.
Jeremiah, 3138c.
*Jeremiah, Book of,* 3138d.
Jericho, Palestine, 3139a.
Jericho rose, 3139a.
Jeroboam I, II, 3139b.
Jerome, Jerome Klapka, 3139c.
Jerome, Saint, 3139d.
Jerome of Prague, 3139d.
Jerrold, Douglas, 3140a.
Jersey cattle, 1234a, 1235b.
Jersey City, N. J., 3140c.
Jersey Island, 3140b.
Jerusalem, 3141b, 6166d.
Jerusalem artichoke, 399a.
Jesuits, 1613a, 3143c, 3529a.
Jesuits' bark, 1380c.
Jesup, Thomas, 4418d.
Jesus Christ, 3144b.
*Jesus Lover of My Soul,* 2895b.
Jet, 3146d.
Jet blower, 779c.
Jethro, 3962d.
Jetsam, 2221a.
Jette, Sir Louis Amable, 3147a.
Jetty, 3147b.
Jevons, William Stanley, 3147d.
Jewelry, 3148a.
Jewfish, 3148d.
*Jewish Antiquities,* 3176b.
Jewish civil year, 6385c.
Jewish Era, 2066b.
"Jewish Hercules," 5183d.
Jews, 3149a.
Jew's-ear mushroom, 4014d.
Jew's-harp, 3151c.
Jeypore, India, 3105a.
Jezebel, 116b, 3151d.
Jhelum River, 3215b.
Jibuti, East Africa, 5438c.
Jigger, 2206c, 3151d.
Jimson weed, 4722a, 5584b.
Jingo, 3152a.
Jinns, 2419a.
Jinrikisha, 3152b.
Jipijapa fiber, 1478d, 2160d.
Jiujitsu, 3181c.
Joachim, Joseph, 3152c.
Joachim I (Naples), 4007b.
Joachimsthal, Bohemia, 5779a.
Joannes Island, 3644c.
*Joan of Arc,* 4451.
Joan of Arc, 3152d.
Joaquin Miller, 3807a.
Job, 3154b.
*Job, Book of,* 3154c.
Job printing press, 4825d.
Job's-tears, 633a.
Jocasta, Queen, 4344b.
Joffre, Joseph Jacques Cesaire, 3154c, 6156b.
Johannesburg, South Africa, 3155a.
John (England), 3155b.
John (Popes), 3155c.
John III (Poland), 3156a.
John VI (Portugal), 4784c.
*John, Epistles of,* 3157c.
*John, Gospel of,* 2541d.
John, Knights of Saint, 3268b.
*John Alden and Priscilla,* 4451.
"John Barleycorn," 4833b.
"John Bull," 953d.
John Day River, 4403c.
*John Halifax, Gentleman,* 371d.
"Johnny Appleseed," 296b.
Johnnycake, 1588b.
"Johnnie Crapaud," 953d.
"Johnny Rebs," 6383b.
John of Bruges, 2117c.
John of Gaunt, Duke of Lancaster, 3156b.
Johns Hopkins University, 3156b.
John Sobieski, 3156a.
Johnson, Andrew, 2936a, 3157b.
Johnson, Cave, 4738b.
Johnson, [Emily] Pauline, 1143c, 3163a.
Johnson, Esther, 5655c.
Johnson, George, 3163b.
Johnson, Hiram Warren, 3163c.
Johnson, Jack, 4830d.
Johnson, John A., 3835b.
Johnson, Lake, 5211b.
Johnson, Richard Mentor, 3163d.
Johnson, Samuel, 3164a.
Johnson City, Tenn., 3164d.
Johnston, Albert Sidney, 3165a.
Johnston, Joseph Eggleston, 3165b.
Johnston, Mary, 3165d.
Johnstown, N. Y., 3166a.
Johnstown, Pa., 3166b.
John the Almoner, 1373a.
John the Apostle, 3156d.

John the Baptist, 3157c.
*John the Baptist,* 4451.
Johore, 3166d.
Johore Bahru, Malay Peninsula, 3167a.
Joint guardianship, 2880b.
Joints (anatomy), 3167a.
Joints (geology), 3167d.
Joint stock company, 3167d.
Joint-stock corporation, 1595c.
Joint-stock insurance companies, 3004d.
Joint worm, 6264b.
Joists, 1194d.
Jokai, Maurus, 3168a.
Joliba River, 4233c.
Joliet, Ill., 3168b.
Joliet, Louis, 3168d.
Joliet, Que., 3169a.
Joly de Lotbinière, Sir Henri Gustave, 3169b.
Jonah, 3169c.
Jonathan, 1709c.
Jones, Alfred Gilpin, 3170a.
Jones, Henry Arthur, 3170b.
Jones, James C., 4738c.
Jones, Jenkin Lloyd, 3170b.
Jones, John Paul, 2670d, 3170d.
Jones, Samuel Porter, 3171b.
Jones, Sir William, 5534b.
Jones Act, 4636d.
Jongleurs, 5885c.
Jonquil, 3171c.
Jonson, Ben, 3171d.
Joplin, Mo., 3172c.
Joppa, Palestine, 3104a.
Jordaens, Jacob, 4454a.
Jordan, David Starr, 3173b.
Jordan River, 3172d.
Jorullo, Mount, 3767d.
Joseph (husband of Mary), 3175a.
Joseph (son of Jacob), 3173c.
Joseph ben Matthias, 3176b.
Josephine, Marie Rose, 3175b.
Josephites, 3342d.
Joseph of Arimathaea, 3176a.
Josephus, Flavius, 3176b.
Josh Billings, 5339d.
Joshua, 3176c.
*Joshua, Book of,* 3176c.
*Josh Whitcomb,* 5795b.
Josiah, 3176d.
Joule, 5942c.
Journal, 815a.
Journalism, Schools of, 3177a.
Journalizing, 815c.
*Journal to Stella,* 5655d.
Journeymen, 2636a.
Jousts, 5849b.
Juan de Fuca, Strait of, 3177b.
Juan Fernandez Islands, 3177d.
Juan Perez, 1501c.
Juarez, Benito, 3178a, 3771d.
Jubal, 2692c.
Jubilee, 3178b.
Judaism, 3149a.
Judas Iscariot, 3178c.
Judas tree, 3178d, 4759c.
*Jude,* 3178d.
Judea, 3179a.
Judge, 3179a.
Judge, or Gatherer, 6419b.
*Judges, Book of,* 3179b.
Judgment (law), 3180a.
Judgment (psychology), 3179c.
Judicial astrology, 438c.
Judicial Committee of the Privy Council, 2588d.
Judicial courts of the United States, 5639c.
Judicial Department of the United States, 5975a.
Judicial oath, 4326a.
Judiciary, 1613d.
Judith, 3180a.
Judson, Adoniram, 3180b, 3843d.
Judson, Harry Pratt, 1317d, 3180c.
Juggernaut, 3180c.
Jugular vein, facing 1388, 3180d.
Jugurtha, 3181a.
Jugurthine War, 3181b.
Jujube tree, 3506d.
Jujutsu, 3181c.
Julian, 3181d.
Juliana, Princess, 6284c.
Julian calendar, 1051c, 3182a.
Julian period, 2066b.
Julius (Popes), 3182b.
July, 3182b.
July, Column of, 3185c.
July Revolution, 3185a.
Jumbo, 2006b.
Jumel Mansion, 4208a.
Jumna River, 3185c.
Jumper, 3966a.
Jumping bean, 3185c.
Jumping Bull, 5396a.
Jumping mouse, 1740b.
Juna River, 2662a.
Junco, 3185d.
Juncto, 3190c.
June, 3188a.
Juneau, Alaska, 3188d.
Juneau, Laurent Solomon, 3813c.
June bug, 1454d, 3188d.
Jungfrau, 3189a.
*Jungle, The,* 5389d.
*Jungle Books,* 3260c, 5810a.
Jungle fowl, 3189b.
Juniata River, 4566a.
Junior lieutenant, 3409a.
Juniper, 3189c.
*Junius Letters,* 3189d.
Juno, 3190a.
Junqueiro, Guerra, 4781b.
Junta, 3190b.
Jupiter (astronomy), 3191a, 4695c.
Jupiter (mythology), 3190c.
Jupiter, Temple of, 452b.
Jupiter Ammon, Temple of, 4325d.
Jura Mountains, 3191c.
Jurassic Period, 2441a, 3191d.
Jurua River, 3192a.
Jury and trial by jury, 3192a.
*Just As I Am,* 2895c.
*Justice,* 2367d.
Justice, Department of, 3192d.
Justice of the peace, 3193c.
Justices of United States Supreme Court, 5638d.
Justin II, 1031d.
Justinian I, 3193d.
Jute, 3194a.
Jute fiber, 2160d.
Jutes, 3194c.
Jutland, 3194d.
Jutland, Battle of, 6167c.
Juvenal, Decimus Junius Juvenalis, 3195a.
Juvenile court, 1327c, 3195b, 3449b.
Juvenile insanity, 3779a.
*Juverna,* 2791c.

# K

K, 3197a.
Kaaba, 3197b, 3714c, 3872b.
Kabara, French West Africa, 5813d.
Kabul, 3197b.
Kabyles, 689c.
Kadiak bear, 637c.
Kadiak Islands, 3197d.
Kaffirs, 3197d.
Kafir corn, 3198a.
Kahoolawe Island, 2717b.
Kaien Island, 4821d.
Kainit, 2156d.
Kaiser, 3198b, 5821a.
Kaiserblume, 535c, 2228a, 3198b.
Kaiser Wilhelm Canal, 3198c.
Kaiser - Wilhelmsland (New Guinea), 4154c.
Kaka parrot, 4513d.
Kaki, 4597a.
Kalahari Desert, 78b, 2466d, 3199a.
Kalamazoo, Mich., 3199b.
Kaleidoscope, 3200a.
Kalends, 4245d.
*Kalevala, The,* 2176a.
Kali, 5804b.
Kali Ghata, 1049c.
Kallima, 4845c.
Kalmar, Union of, 1760b.
Kalmia, 3200b.
Kalmucks, 3200c.
Kalsomine, 1048c.
Kama River, 6112d.
Kamchatka, 3200c.
Kamehameha, House of, 2722a.
Kamerun, West Africa, 81d, 3200d.
Kamloops, 3201b.
Kanakas, 3201c.
Kanawha (proposed state), 6256d.
Kandahar, India, 5034c.
Kane, Elisha Kent, 3201c, 4727b.
Kangaroo, 3201d.
Kangaroo Island, 5454b.
Kankakee, Ill., 3202c.
Kankakee River, 2952d.
Kanpur, India, 1243c.
Kansa Indians, 3216d.
Kansas, 3203a.
Kansas, University of, 3211a.
Kansas City, Kan., 3211b.
Kansas City, Mo., 3213a.
Kansas-Nebraska Bill, 954d, 1845d, 3213d, 4666d, 5517a.
Kansas River, 3214a.
Kant, Immanuel, 3214b.
Kaoliang, 3620d.
Kaolin, 1411b, 3214c.
Kaph, 3197c.
Kappa, 3197c.
Kara, Strait of, 4301c.
Karakorum Mountains, 3214c.
Karlsbad, Bohemia, 1186c.
Karlsruhe, 3214d.
Karluk, Alaska, 3197d.
Karnak, 5782d.
Karshi, 794d.
Karun River, 4595a.
Kash, 4482d.
Kashgar, Turkestan, 3215a.
Kashmir, India, 3215b, 3588a.
Kashmir, Vale of, 5314d.
Kaskaskia, Ill., 1407d.
Kassel, Germany, 1217a.
Kassites, 533d.
Kastro, Island of Rhodes, 5001a.
Katahdin, Mount, 3215c, 3600d.
Katipunan, 4634b.
Katrine, Loch, 2506d, 3215d, 5259c.
Kattegat, 1232c.
Katydid, 3215d.
Kaulbach, Wilhelm von, 3216b.
Kaunitz, Wenzel Anton Dominik, 3216c.
Kauri gum, 4221b.
Kawai Island, 2717c.
Kaw Indians, 3216d.
Kaw River viaduct, 6075c.
Kayak, 2077b.
Kazan, Russia, 3216d.
Kazanka River, 3216d.
Kea, 4513d.
Kean, Charles John, 3217b.
Kean, Edmund, 3217a.
Kearney, N. J., 3217b.
*Kearsarge,* 131d, 5299c, 6317c.
Kearsarge Mountain, 4155d.
Keating-Owen Act, 1327b.
Keats, John, 3217c.
Keble, John, 4436a.
Kebnekaisse, Mount, 5646a.
Keddah, 2006d.
Kedron, Valley of, 3141b.
Kedwich River, 4979a.
Kedzie mixture, 3002a.
Keeled lizard, 3470b.
Keeley, Leslie E., 3218b.
Keeling Islands, 5390b.
Keel-tailed grackle, 1649a.
Keene, Laura, 3218c.
Keene, N. H., 3218c.

Keeper of the Great Seal, 4830b.
Keewatin, Ont., 3219a.
Keijo, Chosen, 1364d.
Keller, Helen, 1720b, 3219a.
Kellogg, Clara Louise, 3219c.
Kellogg, William P., 5532c.
Kelowna, B. C., 3219d.
Kelp, 3220a.
Kelung River, 238c.
Kelvin, William Thomson, 3220b.
Kemble, Frances Anne, 3220c.
Kemp, Albert Edward, 3220d.
Kemp Land, 4728c.
Kendall, Amos, 3221a.
Kendrew, John, 3450a.
Kenesaw Mountain, Battle of, 3221b.
Kenia Mountain, 77b.
Kenilworth, Eng., 3221b.
Kenilworth Castle, 3231c.
Kennan, George, 3221d.
Kennebec River, 3222a.
Kennedy, William D., 5695a.
Kenogami River, 151c.
Kenora, Ont., 3222a.
Kenosha, Wis., 3222b.
Kensington Gardens, 3222c.
Kensington Palace, 3222c.
Kent, James, 3222d.
Kentucky, 3223a.
*Kentucky*, 1451d.
Kentucky, University of, 3231b.
Kentucky and Virginia Resolutions, 201a, 3231c.
*Kentucky Cardinal*, 1182d.
Kentucky River, 3231c.
Kentville, N. S., 3231d.
Keokuk, Ia., 3231d.
Keokuk Dam, 3232b.
Kepler, Johann, 3232c.
Kepler's laws, 3232d.
Kerensky, Alexander, 5122d, 6164c.
Kerioth, Asia Minor, 3178c.
Kermis, 2127b.
Kerosene, 3233a.
Kerosene emulsion, 3002b.
Kerr, Robert J., 6056a.
Kestrel, 3233b.
Ketchup, 3233c.
Kettledrum, 1866a.
Kettle net, 4122c.
Keuka, Lake, 4196c, 5302a.
Kewanee, Ill., 3233d.
Keweah Peak, 1057b.
Keweenaw Peninsula, 3784d.
Kew-net-che-chat Indians, 3610a.
Key (music), 3234a.
Key, David M., 2731a.
Key, Francis Scott, 2323a, 3234a.
Keynote, 4026b.
Key signature, 4028a.
Keystone, 318c, 921a, 3234b.
Keystone State, 4563b.
"Keystone State" (tree), 5309c.
Key to India, 2777b.
Key to the Mediterranean, 2491b.
Key West, Fla., 3234c.
Khaborovsk, Siberia, 241c.
Khadija, 3871d.
Khaibar Pass, 3236a.
Khaki, 5940a.
Khalhka, Mongolia, 3889b.
Khamsin, 3235a.
Khan, 3235a.
Khan-Tengri Peak, 5805a.
Kharkov, Russia, 3235b.
Khartum, Egypt, 3235b.
Khayyam, Omar, 4375d, 5096d.
Khedive, 3235c.
Khelat, Khan of, 565d.
Khiva, 3235d.
Khufu, 1299b, 4878b.
Khyber Pass, 75a, 3236a.
Kiakhta, Siberia, 3889b.
Kiao-chou, China, 3236a.
Kibo, Mount, 3238c.
Kickapoo Indians, 3236c.
Kidd, William, 3236d.
Kid gloves, 2513a.
Kidnapping, 82a, 3737a.
Kidney bean, 633d.
Kidneys, facing 1388, 1390c, 3237c.
Kidney-shaped leaf, 3361c.
Kieffen pear, 4542c.
Kiel, Germany, 3237d.
Kiel, Treaty of, 4288b.
Kiel Canal, 3198c.
Kiev, Russia, 3238a.
Kilauea, 3238b.
Kilauea Point lighthouse, 3427c.
Kilimanjaro Mountain, 77b, 3238c.
Killarney, Ireland, 3238c.
Killarney roses, 5081b.
Killdeer, 3238d.
Kiln, 918d.
Kilogram, 3239a, 3758b.
Kilogrammeter, 3239a.
Kilometer, 3239b.
Kilowatt, 3239c.
Kilpatrick, Hugh Judson, 3239c.
Kilrain, Jake, 4830c.
Kimberley, South Africa, 3239d.
Kimberley diamond mine, facing 1784.
Kimono, 5326a.
Kincardine, Ont., 3239d.
Kindergarten, 1324c, 3240a.
Kinematics, 3255d, 3714d.
Kinetic energy, 2032b, 6046b.
Kinetics, 3714d.
Kinetograph, 3255d.
Kinetoscope, 3255d, 3989c.
King, 3255d.
King, Ben, 4512b.
King, Clarence, 3256a.
King, The Citizen, 3522c.
King, W. B. Basil, 1143a.
King, William Lyon Mackenzie, 3256b.
King, William Rufus, 3256c.
King Arthur's Round Table, 5091c.
Kingbird, 3256d.
King Bomba, 2152b.
King Charles South Land, 5809b.
King Charles spaniel, 5479d.
Kingdom, 2027a.
Kingdom of Solomon, 5435b.
Kingdom of the Two Sicilies, 5371c.
King Edward VII Land, 276d.
Kingfisher, 3257a.
King George's War, 2330a, 5610b.
Kinghunters, 3257a.
*King James Version*, 705b, 3107c.
Kinglet, 3257c.
King-maker, The, 6185b.
King Philip, 3258a.
King of bells, 3961b.
King of metals, 2524a.
King Oscar II Land, 2552c.
King post, 1194d.
King rail, 4915c.
*Kings*, Books of, 3258a.
King salmon, 5174b.
King's bedchamber, 5503a.
King's College, 1499b.
King's Counsel, 601d.
King's evil, 5271c.
Kingsford, William, 1142c, 3258b.
Kingsley, Charles, 3258c.
King's men, 4550a.
King's Mountain, Battle of, 4989b.
Kingston, Jamaica, 3259b.
Kingston, N. Y., 3259c.
Kingston, Ont., 3259a.
Kingston-upon-Hull, Eng., 2867b.
King's touch, 5635d.
Kingstown, Saint Vincent Island, 5168c.
King vulture, 6118d.
King William's war, 2329b.
Kinnickinnick River, 3813b.
Kinzie, John, 1316c.
Kiosk, 4446a.
Kioto, Japan, 3282a.
Kiowa Indians, 3260a.
Kipling, [Joseph] Rudyard, 3260b.
Kippered herring, 2787b.
Kirby, William, 1143a, 3261a.
Kirghiz, 3261b.
Kirk, Sir David, 4300d.
Kirkfield Lock, 5873d.
Kirkwall (city), Orkney Islands, 4414a.
Kirtland, O., 3951c.
Kishinev, Russia, 3261b.
Kishm Island, 4596c.
Kisogawa River, 3118c.
Kiss, August, 5276c.
Kit Carson, 1202a.
Kit-Cat Club, 1441a.
Kitchen Cabinet, 3231a, 3261c.
Kitchen decoration, color plate, facing 3015.
Kitchener, Horatio Herbert, 3261d.
Kitchener, Ont., 3261c.
Kitchen garden, 2851c.
Kitchen middens, 3262d.
Kitchen schools, 5237a.
Kite, 3262d.
Kite (bird), 3265c.
Kite-balloon, 3263c.
Kittatinny Range, 4163a.
Kittiwake, 2640c, 3265d.
*Kitty miaou* (game), 2378d.
Kiushiu Island, 3115c.
Klamath Indians, 3266a.
Klar River, 5646c.
Klausenburg, Transylvania, 3266b.
Klein, F. A., 3867c.
Kleptomania, 3266b.
Klingsor, 4515c.
Klint, 5646b.
Kloet, Mount, 3126d.
Klondike, 3266c.
Klondyke snowshoe, 5423c.
Knaus, Ludwig, 4455a.
Kneecap, 5399b.
Knees (botany), 1682c.
Kneipp, Sebastian, 3267b.
*Knickerbocker's History of New York*, 3067d.
Knife, 3267c.
Knight, 1358a, 3268c.
Knighthood, 1358a.
Knighthood, Orders of, 3268c.
Knights bachelors, 3268c.
Knights Hospitalers of Saint John, 3268d.
Knights of Columbus, 3269a.
Knights of Labor, 1420b, 3269b.
Knights of Maccabees of the World, 3551d.
Knights of Malta, 3268d, 3615a.
Knights of Pythias, 4880d.
Knights of Saint John of Jerusalem, 3268d.
Knights of the Round Table, 5091c.
Knights Templars, 5745c.
Knitting machine, 3269b.
Knivskjaerodden Island, 4259c.
Knockout drops, 282a, 1358c.
Knot, 3270a.
Knot (nautical), 3269c, 3796c.
Knotgrass, 3269d.
Knotweed, 3269d.
Know-nothings, 3271a.
Knox, Henry, 3271a.
Knox, John, 3271b, 4960c.
Knox, Philander Chase, 3272b.
Knox College, 3272c.
Knoxville, Tenn., 3272d.
Knyahinya meteor, 3755c.
Koa, 2718d.
Koala, 3273c.
Kobdo district, 3889b.
Kobe, Japan, 3273d.
Koch, Robert, 3274a.
Kochanska, Marcelline, 5298b.
Kodak, 1080b.
Kodiak Island, 138b, 3197d.
Kodok, Africa, 3274b.
Koenig, Paul, 5603d.
Kohinoor, 3274c.
Kohinoor diamond, 1786b.
Kohl-rabi, 3274c.
Kohlrube, 3274c.

Kohuhui, Hawaiian Islands, 2721a.
Kokomo, Ind., 3274d.
Köln, Prussia, 1475c.
Kongo, 1534a.
König, Friedrich, 4825c.
Königsberg, Prussia, 3275a.
Konstanz, Lake, 1554b.
Koodoo, 278d, 3275b.
Kootenay, 3275c.
Kootenay District, 3276a, 4113b.
Kootenay River, 3275d.
Kopeck (coin), 1468b.
Kopje, 5863c.
Koran, 3276c, 3873c, 5907b.
Kordofan, Egypt, 3277a.
Korea, 1363b, 3277b.
Kosciusko, Mount, 485a, 4183b.
Kosciusko, Thaddeus, 3277b.
Kossovo, Battle of, 5312c.
Kossuth, Louis, 3277c.
Koszta, Martin, 4667d.
Kotelnoi Island, 4182d.
Kotonu, Dahomey, 1687d.
Koumis, 3278a.
Kovno, Russia, 3278a.
Kra, Isthmus of, 3074d.
Kraals, 5506d, 6419d.
Kracow, Galicia, 1621d.
Krafft, Adam, 5276b.
Krag-Jorgensen rifle, 5017c, 5409d.
Krapotkin, Peter Alexeyevitch, Prince, 3279a.
Krefeld, Germany, 3278b.
Kremlin, The, 3278c, 3961b.
Kriegspiel, 6130b.
Kriemhild, 4226c.
Kronstadt, Russia, 3278d.
Kronstadt Canal, 1147b.
Kropotkin, Peter Alexeyevitch, Prince, 3279a.
Kruger, Stephanus Johannes Paulus, 3279b.
Krupp, Bertha, 3280a.
Krupp, Friedrich Alfred, 3279d.
Krupp ordnance, 5345d.
Krypton, 1294d.
Kubelik, Jan, 3280a.
Kublai Khan, 3280b, 4744c.
Kubu tribe, 5622c.
Kudu, 278d, 3275b.
Kuen-lun Mountains, 3280c.
Ku-Klux Klan, 3280c.
Kuku-Nor, Lake, 5806c.
Kumassi, Ashanti, 410a.
Kumiss, 2153d, 3278a.
Kumquat, 3281a.
Kunashiri Island, 3281c.
Kunchinjunga, Mount, 2797b.
Kundry, 4515c.
Kupros, 1682d.
Kurdistan, 3281a, 5909d.
Kurdistan Mountains, 4594c.
Kurik, 5119a.
Kurile Islands, 3281c.
Kurisches Haff, 2470a.
Kuroki, Tamesada, 3281d.
Kuropatkin, Alexei Nikolayevitch, 3282a.
Kuro Siwo, 3124c.
Kuskokwim River, 136d, 3282c.
Kut-el-Amara, Turkey, 5811d, 6166b.
Kutenai Indians, 3275c.
Kvalo, Island of, 2677b.
Kvass, 5132b.
Kwang Chow Wan, Bay of, 2332a.
Kwang-su, 1352a.
Kyanite, 3282a.
Kyaxares, 533d.
Kyoto, Japan, 3282d.

# L

L, 3283a.
Laban, 4910b.
*La Belle Jardinière*, 4451.
Labiate, 3283a.
Labor, Department of, 3283b
Labor, Division of, 3284a.
Labor, Hours of, 3285a.
Labor and machinery, 3561c.
Laboratory method of canning, 2247d.
Labor day, 3284b.
Laborers, Restrictions on, 3285c.
Labor legislation, 3284c.
Labor organizations, 3285c.
Labor-saving books, 827a.
Labor-saving journal, 817c.
Labor theory of value, 6025c.
Labouchere, Henry Duprey, 3286c.
Labrador, 3286d.
Labrador Current, 1100a, 3288a, 4334c.
Labrador "huskies," 141c, 1827c.
Labradorite, 3288b.
Labrador spar, 3288b.
Labrador tea, 3288c.
Labuan Island, 5390b.
Laburnum, 3288c.
Labyrinth, 3288d.
Labyrinth (ear), 1899b.
Lac, 3289b.
Laccadive Islands, 3289c.
Lace, 3289d.
Lace-bark tree, 3290d.
Lacedaemon, 5482c.
Lace-winged flies, 3290d.
Lachesis, 2141c.
Lachine, Que., 3291a.
Lachine Canal, 1147b.
Lachlan River, 3291c.
Lachrymal bones, 2123d, 2738d.
Lachrymal glands, 2119a, 3291c.
Lackawanna, N. Y., 3291d.
Lackland, 3155b.
Lac la Ronge, 5211b.
La Colle Falls, 4818a.
Lacombe, Alta., 3292a.
Laconia, 318a, 3292a.
Laconia, N. H., 3292b.
La Corbeille, 4883a.
Lacquer ware, 3292d.
Lacrosse, 3293a.
La Crosse, Wis., 3293b.
Lacteals, facing 1388, 3293d.
Lactic acid, 3294a.
Lactometers, 2889c.
Lactose, 1177d.
*Laddie*, 5324d.
Ladies' Christian Association, 6401c.
Ladies' eardrops, 2345d.
Ladies' Mount Vernon Association, 3981b.
"Ladies of Hell," 5257a.
Lading, Bill of, 719a.
Ladinos, 5179d.
Ladislas I, 4724a.
Ladoga, Lake, 3249b
Ladon, 2788a.
Ladrone Islands, 3294b.
Ladybird, 3294c.
Lady Godiva, 2520b.
Lady Gregory, 3056a.
"Lady in her chair," 1217b.
Lady Jane Grey, 2625a.
Lady Macbeth, 3551a.
*Lady or the Tiger, The*, 5557a.
Ladysmith, B. C., 3295a.
Ladysmith, South Africa, 3294d.
Lady's slipper, 3295a.
"Lady Washington," 6208c.
Laestrygones, 4343c.
La Farge, John, 3295b.
Lafayette, Ind., 3295c.
Lafayette, Marie Jean Paul Yves Roch Gilbert du Motier, Marquis de, 3296a.
Lafayette, Mount, 4155d, 6275a.
La Follette, Robert Marion, 3297a.
Lafontaine, Jean de, 3298a.
Lafontaine, Sir Louis Hippolyte, 3298b.
Lager beer, 659a.
Lagerlof, [Ottilia Lovisa] Selma, 3298d.
Lago Maggiore, Italy, 3591a.
Lagoon, 3299a.
Lagos, Nigeria, 4234b.
Lagthing, 2138c, 4288a.
La Guayra, Venezuela, 3299b, 6048a.
Lahore, India, 3299c.
*L'Aiglon*, 4963c.
Laius, 4344a.
Lake, 3299d.
Lake, Mount, 4172b.
*Lake, The*, 4451.
Lake Charles, La., 3301a.
Lake Drummond Canal, 1147a.
Lake Dwellings, 3301b.
Lake Erie, 2069d.
Lake Erie, Battle of, 2070b.
*Lake Isle of Innisfree*, 3056b.
Lake Landing, 1147a.
Lake Leman, 2417b.
Lake McDonald, 2502d.
Lake Maracaibo, 3644b.
Lake Megantic, 3723c.
Lake Michigan, 3789c.
Lake of the Woods, 3301d.
Lake Ontario, 4387c.
Lake poets, 3302b.
Lakes (colors), 3302b.
Lake Saint Clair, 5148a.
Lake Saint John, 5142b.
Lake School, 3302b.
Lakes, Great, 2596b.
Lakes of Maine, 3601b.
Lakes of Minnesota, 3828d.
Lakes-to-the-Gulf waterway, 5968c.
Lake sturgeon, 5596a.
Lake Superior, 5630c.
Lake Washington Canal, 1146b.
Lakewood, O., 3302c.
Lake Zurich, 6420c.
Lakh of rupees, 5108a.
*Lalla Rookh*, 3598a.
Lama, 3302c, 5806d.
Lamaism, 3302c.
Lamanites, 3951b.
Lamar, Lucius Quintus Cincinnatus, 3302d.
Lamarck, Jean Baptiste Pierre Antoine de Monet de, 3303a.
Lamartine, Alphonse de Prat de, 3303a.
Lamb, Charles, 3303b.
Lambeth Conferences, 256c.
Lamb's wool, 6354b.
Lamed, 3283a.
Lamentations, 3304a.
Laminated gun barrels, 5362b.
Lammergeier, 3304b.
Lamp, 3304c.
Lampblack, 1270a, 3304d, 5441b.
Lampman, Archibald, 1143c, 3305a.
Lamp of Callimachus, 2068d.
Lamprey, 3305b.
Lanai Island, 2717c.
Lancaster, House of, 3306b.
Lancaster, O., 3305b.
Lancaster, Pa., 3305d.
Lance-corporal, 381d, 1594c.
Lancelot, 3306c.
Lanceolate leaf, 3361c.
Lancet arch, 319a.
Lancewood, 3306d.
Lanciers, 1697b.
Land, Improved and unimproved, in the United States, 5958b.
Land, Selling price of, 4972b.
Land and sea breezes, 3307a.
Land banks, Federal, 5108d.
Land crab, 1620d, 3307b.
Land-grant colleges, 102a.
Land hemisphere, 4332c.
Landlord, 5746d.
Landlords of New York City, 436c.
Land of ice and fire, 2905c.
Land of Mañana, 3765a.
Land of Steady Habits, 1545b.
Land of the Midnight Sun, 4282d.
Land of the Thousand Lakes, 2176b.

Land of the White Elephant, 5366a.
Land of the Yellow Robe, 5366b.
Land of Wooden Nutmegs, 4315b.
Landor, Walter Savage, 3307c.
Land rail, 4915c.
Lands, Public, 3307c.
Landscape architecture, 3310c.
Landseer, Sir Edwin Henry, 3311c.
Landseer, Thomas, 3312a.
Land's End, 3312b.
Landsmaal, 4283b.
Land snail shells, 5419a.
Landsthing (Swedish), 1759b, 5649b.
Landstorm (Norwegian), 4286d.
Landstrum (Swedish), 5649a.
Landstrum (Swiss), 5662c.
Landsturm (German), 3312b.
Land surveying, 5641c.
Landtag (Prussian), 4854b.
Landvärn (Norwegian), 4286d.
Landwehr (German), 3312c.
Landwehr (Swiss), 5662c.
Lanfranc, 3312c.
Lang, Andrew, 3312d.
Lang, Anton, 4522a.
Langen, Eugene, 3893c.
Langevin, Sir Hector Louis, 3313a.
Langevin, The Most Reverend Louis Philippe, 3313b.
Langland, William, 3313c.
Langley, Samuel Pierpont, 3313d.
*Langley's Folly*, 3314a.
Langtry, Lily, 3314a.
Language, 3314b.
Language of flowers, 2228a.
Languages of Europe, 2094b.
Languages of the world, 3325d.
Language work in the home, 3315d.
Langue d' oc, 2332c.
Languedoc Canal, 1148b.
Langue d' oil, 2332c.
Lanier, Sidney, 3327c.
Lanier's birthday, Program for, 3328a.
Lanka, 4927c.
Lansdowne, Henry Charles Keith Petty-Fitzmaurice, 3328c.
Lansford, Pa., 3329a.
Lansing, Mich., 3329b.
Lan-tao, Island of, 2827d.
Lantern buoy, 1000c.
Lantern fish, 3329c.
Lanthanum, 1294d.
*Laocoön*, 3329d, 5888a.
Laomedon, 4117b, 4815b.
Laos, French Indo-China, 2331d.
Lao-tse, 1533b, 5699a.
La Passe (dance), 4883a.
La Paz, Bolivia, 3330b.
La Perouse, Strait, 5168d.
Lapidary, 3330c.
Lapis lazuli, 3330d.
Laplace, Pierre Simon, Marquis de, 3331a.
Lapland, 3331b, 4964c.
La Plata, Argentina, 3332b.
La Plata, Rio de, 4701b.
La Porte, Ind., 3332b.
Lapps, 3331b.
Laprairie, Que., 3332d.
La Promenade (dance), 4883a.
Lapwing, 3332d.
La Rabida Convent, 1501b.
Laramie, Wyo., 3333b.
Laramie plains, 5045a.
Larceny, 3333c.
Larch, 3333d.
Larch cone, 1529d.
Larcom, Lucy, 3334b.
Lard, 3334c.
Laredo, Tex., 3334d.
Lares and penates, 3335a.
Large-flowered trillium, 5879d.
Large intestine, 3024b.
Larghetto, 4026a.
Largo, 4026a.
Largo d' Averno, 519b.
Larissa, Greece, 5789d.
Lark, 3335b.
*Larks in the Cornfield, The*, 5576b.
Larkspur, 3335d.
Larksville, Pa., 3336a.
Larva, 1023c, 3336b.
Larval butterfly, 3752b.
Larva of mosquito, 3965d.
Laryngitis, 3336c.
Larynx, 3336d.
La Salle, Ill., 3338b.
La Salle, René Robert Cavelier Sieur de, 3337b.
Lasalle, Ferdinand, 3338c, 5424c.
Lassa, Tibet, 3398b.
Lassen Peak, 1068a.
Lassen Volcanic National Park, 1068c, 4504d.
*Last Judgment, The*, 3779d, 4451.
*Last Supper*, 4451; 6087b.
Las Vegas, N. M., 3338d.
Latent energy, 5539d.
Latent heat of steam, 5538c.
Lateral moraine, 2501d, 3945a.
Lateral surface, 1680c, 4826d.
Lateran, 3339a.
Lateran obelisk, 4328c.
Lath and plaster, 4700b.
Lathe, 3339b.
Lathrop, Julia Clifford, 3339d.
Latimer, Hugh, 3340a.
Latin America, 5448b.
Latin cross, 1646b.
Latin Empire, 1032b.
Latin language, 3340c.
Latin liturgy, 3466d.
Latin Monetary Union, 3341d.
Latins, 3342c.
Latin system of punctuation, 4870c.
Latitude, 3342a.
Latitude (factor in climate), 1430d.
Latitude, Comparative, 5977b.
Latium, 3342c.
La Trappe monastery, 5865c.
Latrobe, Pa., 3342c.
Latter Day Saints, Reorganized Church of Jesus Christ of, 3342d.
La Tuque, Que., 3343a.
Laud, Louis Marie Julien, 3505d.
Laud, William, 3343a.
Laudanum, 3343b.
*Laughing Cavalier*, 4451.
Laughing gas, 4242a.
Laughlin, James Laurence, 3343c.
Launceston, Tasmania, 5709a.
Laundry, 3343d.
Laundry soaps, 5424a.
La Union, Central America, 5179c.
Laura de Noves, 4610b.
Laureate, 4719b.
Laureate of the South, 2734d.
Laurel, 1301b, 3344b.
Laurel, Miss., 3344c.
Laurens, Henry, 3345a.
Laurentian plateau, 1096a, 3345a.
Laurentian shield, 3345a.
Laurentide National Park, 4890a.
Laurentius, 285b.
Laurier, Sir Wilfrid, 1127b, 3346a.
Laurium, Mich., 3347c.
Lausanne, Switzerland, 3347c.
Laut, Agnes Christina, 3347d.
Lauzon, Que., 3348b.
Lava, 3348b.
Laval-Montmorency, Francois Zavier de, 3349a.
Laval University, 3348d.
Lavater, Johann K., 4651c, 4658d.
Lavender, 3349b.
Law, 3349c.
Law, Andrew Bonar, 3352b.
Law, John, 3352b, 3854a.
Lawes, Sir John Bennett, 5088b.
Lawn bowling, 871c.
Lawn tennis, 3352c.
Law of equilibrium, 6265a.
*Law of Holiness*, 4576b.
Law of nations, 3019b.
Law of proportion, 4843b.
Lawrence, James, 3353b.
Lawrence, Kan., 3353d.
Lawrence, Mass., 3354b.
Lawrence, Saint, 2075a.
Law schools in Canada, 3350d.
Law schools in the United States, 3350b.
Laws of the pendulum, 4559a.
Laws of the Twelve Tables, 5058b.
Lawton, Henry Ware, 3354d.
*Lays of Ancient Rome*, 1219c, 2835b, 3550a.
Lazareff, Chosen, 1364b.
Lazarus, 3355a.
Lazurite, 3330d.
Lazy bird, 1618d.
Leaching, 1411c.
Leach's petrel, 4610d.
Leacock, Stephen Butler, 1143b, 3355b.
Lead, 3355c.
*Lead, Kindly Light*, 2896b, 4170c.
Lead, Sounding, 3356c.
Lead, S. D., 3356b.
Lead acetate, 3355d.
Lead glance, 2362a.
Lead pencil, 2575b, 4557c.
Lead poisoning, 3356d.
Lead tree, 3356a.
Leaf buds, 975d.
Leaf curl, 4539b.
Leaf insect, 3357a.
Leaf lard, 3334c.
Leaf lettuce, 3390d.
Leaf rust, 301c.
Leaf spot, 4542d.
League, 3357a.
League Island, Pa., 4623d.
League to Enforce Peace, 3357b.
Leah, 4910b.
Leaks, Testing for (plumbing), 4711b.
Leamington, Ont., 3357c.
Leander, 2783b.
Leaning Tower of Pisa, 4683a.
Leap year, 3357d, 6385b.
Lease, 3358a, 5746d.
Least common multiple, 3358b.
Least tern, 5761d.
Leather, 837d, 3359b, 5963c.
Leatherback turtle, 3360a, 5920a.
Leather carp, 1192d.
Leather cloth, 3359d.
Leavenworth, Kan., 3360b.
Leaves, 3360d.
*Leaves of Grass*, 6277b.
*Leaving the Hills*, 4452.
Lebanon, Cedars of, 1244d.
Lebanon, Mountains of, 3363d.
Lebanon, Pa., 3364b.
Lebombo Hills, 5863b.
Le Breton, Lily, 3314c.
Lecky, William Edward Hartpole, 3364c.
Le Clanché battery, 1982d.
Lecompton Constitution, 3210b, 3364d.
Le Conte, Joseph, 3365a.
Le Conte pear, 4542c.
Ledger, 812c.
Ledochowski, Father Wlodimir, 3144b.
Ledum, 3288c.
Lee, Ann, 5331c.
Lee, Arthur, 4689a.
Lee, Charles, 3365a.
Lee, Henry, 3365b.
Lee, Jason, 4408d.
Lee, Richard Henry, 1735b, 3365d.
Lee, Robert Edward, 3366a, 6147c, 6149d.
Lee, William, 3269c.
Leech, 3369c.
Leeds, Eng., 3369d.

Lee Enfield rifle, 5017d.
Leek, 3370a.
Lee Metford rifle, 5017d.
Lee's birthday, Program for, 3369a.
Lee's home, Richmond, 6097b.
Lee's resolution, 1735b.
*Leetle Bateese,* 1144b.
Leeward Islands, 3370b.
Leffingwell, Ensign, 5937d.
Left bower, 2088d.
Legacy, 3370b.
Legal interest rates, 3012a.
Le Gallienne, Richard, 3370c.
Legal tender, 3370d.
Legate, 3371b.
Legend, 3371b.
Legend of coin, 4311c.
Legendre, Adrien Marie, 3371c.
Legends of the spider, 5498c.
Legerdemain, 1541c, 3371d.
Leghorn, 3371d.
Legion, 3372a.
Legion of Honor, 3372c.
Legislature, 3372d.
Legumes, 3380d.
Leguminous plants, 3373c.
Lehi, 3951a.
Lehigh Coal and Navigation Co., Canal, 1147a.
Lehigh River, 3373d.
Leibnitz, Gottfried Wilhelm, Baron von, 3373d.
Leicester, Eng., 3374a.
Leicester, Robert Dudley, Earl of, 2012d, 3374b.
Leighton, Frederick, Lord, 3374c.
Leine River, 2686d.
Leipzig, Battles of, 3375b.
Leipzig, Germany, 3374d.
Leipzig Disputation, 3724b.
Leise, 2717d.
Leith, Scotland, 3375c.
Leland Stanford Junior University, 3375d, 5525a.
Le Mans, France, 3376c.
Lemay, Léon Pamphile, 1142b, 3376d.
Lemberg, Austria-Hungary, 3377a.
Lemieux, Rodolphe, 3377b.
Lemming, 3377c.
Le Moine, Sir James MacPherson, 1142a, 3378a.
Lemon, 3378a.
Lemon extract, 3378d.
Lemon guava, 2633d.
Le Moulinets (dance), 4883a.
Lempa River, 5179c.
Lemur, 3379a.
Lemurian zone, 6416a.
Lena River, 3379c.
L'Enfant, Pierre Charles, 6194a.
Length of states, 5973a.
Lenine, Nicolai, 6165a.
Lenni Lenape, 1747c.
Lenox, James, 3379d.
Lens, 2118b, 3379d.
Lens for school work, 4084d.
Lent, 3380d.
Lentil, 3380d.
Lento, 4026a.
Leo (Popes), 3381b.
Leo, the Lion, 3382b.
Leofric, Lord of Coventry, 2520b.
Leominster, Mass., 3382c.
Leon, Nicaragua, 3382d.
Leonardo da Vinci, 6086d.
Leonardo of Pisa, 4291a.
Leon de Los Aldamas, Mex., 3382d.
Leone, Monte, 5151c.
Leonidas, 3383a, 5787c.
Leontes River, 3364a.
Leopard, 3383b.
Leopard cat, 4336d.
Léopold, Alexandre César, 755d.
Leopold I, 88a, 3383c.
Leopold II, 1534b, 3383d.
Lepanto, Battle of, 4691c, 5912b.
Le Pas, 4520a.
Lepidoptera, 3384a.
Lepidus, Marcus Aemilius, 3384b.
Leprosy, 3384b.
Lepta, 1849c.
Lerna, Lake, 2884a.
Lesage, Alain René, 3385a.
Lescarbot, Marc, 3385b.
Les Chevaux de Bois, 4883a.
Lescot, Pierre, 2543d.
*Les Miserables,* 2865b, 3385b.
Les Saintes Island, 2630a.
Lessee, 3358a.
Lesseps, Ferdinand, Vicomte de, 3385d, 4474a.
Lesser Antilles, 284a.
Lesser Slave Lake, 155c.
Lessing, Gotthold Ephraim, 3386a.
*Lesson in Anatomy,* 4452.
*Lesson of Silence* (game), 3922c.
Lessons in music, 4021a.
Lessor, 3358a, 5747a.
Leszczynska, Stanislaus, 5610a.
Lethbridge, Alta., 3386c.
Lethe, 3386d.
Letter of credit, 1629b.
Letter of marque, 4829c.
Letters, 3386d.
Letter writing, 3387b.
Lettish language, 3390c.
Letts, 3390b.
Lettuce, 3390c.
Leu (coin), 1468c.
Leucadia, Ionian Islands, 2743d.
Leuctra, Battle of, 2607a, 2765b, 5483d.
Leutze, Emanuel, 3391a.
Levant, 3391b, 5908d.
Levant morocco, 3391b.
Levee, 3391b.
Level, 3391d.
Leven River, 6311b.
Lever, 3392a, 3714a.
Lever, Charles James, 3393b.
Leverrier, Urbian Jean, 4117c.
Leviathan, 3393c.
Leviathan of literature, 3393c.
Lévis, Que., 3393c.
Levites, 3393d.
Leviticus, 3394a.
Lewes, Battle of, 3930c.
Lewes, George Henry, 2011a, 3394a.
Lewes Canal, 1147a.
Lewes River, 6404b.
Lewis, Meriwether, 3394b.
Lewis, William B., 3261c.
Lewis and Clark expedition, 3132a, 3394d.
Lewis and Clark exposition, 3395c.
Lewis Carroll, 1826a.
Lewis, Nicola, 4148c.
Lewiston, Ida., 3395c.
Lewiston, Me., 3395d.
Lewistown, Pa., 3396b.
Lew Wallace, 6127d.
Lexicon, 1793b.
Lexington, Battle of, 3396b.
Lexington, Ky., 3396d.
Leyden, Holland, 3397b.
Leyden jar, 1993a, 3397c.
Lhasa, Tibet, 3398b.
Liability of the maker of note, 4292c.
Liakhov Island, 4182d.
Liao-tung peninsula, 1349d, 5126c.
Libau, Russia, 3398c.
Libel, 3398c.
Liberal party, 3398d.
Liberal party in Canada, 4736b.
Liberal Republican party, 2570a, 3399a.
*Liberator, The,* 2395d.
Liberia, 3399b.
Liberian coffee, 1464c.
Liberian hippopotamus, 2800a.
Liberty (Montessori Method), 9325a.
Liberty Bell, 1736b, 3400d.
Liberty Bond issues, 6176b.
Liberty Cap, 3401b.
*Liberty Enlightening the World,* 1496c, 3400a.
Liberty motors, 6168d.
Liberty of the press, 4813d.
Liberty party, 3401c.
Libra, 3402a.
Libra (coin), 1468c.
Librarianship as a profession, 3403d.
Library, 3402a.
Library commissions, 3404c.
Library of Congress, 3405a.
Library of the Vatican, 6040c.
Libya Italiana, 5881d.
Libyan Desert, 5142d.
License, 3405c.
Lichas, 2781a.
Lichens, 3406a.
Licinian law, 5058d.
Lick, James, 3407a.
Lick Observatory, 1065d, 3406c.
Licorice, 3407b.
Lictors, 3407b.
Liddell, Alice, 1826a.
Lieb, Michael, 4006a.
Liebfraumilch (wine), 6360b.
Liebig, Justus, Baron von, 3407c.
Liebknecht, Karl, 5424d.
Liechtenstein, 3408a.
Liege, 2158c.
Liége, Belgium, 3408b.
Liegnitz, Battle of, 4724a.
Lien, 3408d.
Lies, Father of, 2142a.
Lieutenant, 3408d.
Lieutenant-colonel, 4929a.
Lieutenant-commander, 3409a.
Lieutenant-general, 4929a.
Lieutenant-governor, 3409a.
Life, Length of, 3419a.
Life, Span of, 4761b.
Lifeboat, 3421a.
Life buoy, 3421b.
Life estate, 2080d.
Life extension, 3409c.
Life insurance, in arithmetic, 3007a.
Life policy (insurance), 3005d.
Life preserver, 3421c.
Life-saving gun and rocket, 3421c.
Life-saving service, 3419c.
Lift bridge, 923b.
Lift pump, 4869b.
Ligament, 3421d.
Ligan, 2221a.
Liger River, 3496c.
Light, 3422a, 4957a.
Light, Maude, 2920a.
Light, Reflection of, 4957a.
Light cruiser, 4096c.
Lighthall, William D., 1143a.
Lighthouse, 3425c.
Lighthouse service, 3427d.
Lighthouses, Bureau of, 1512c.
Lighting circuits, 1991a.
Lightning, 3427d.
Lightning bug, 2182b.
Lightning rod, 3430b.
Light of the moon, 3940b.
*Light of the World,* 4452.
Light ruby silver, 5386b.
Lightships, 3427c.
Light waves, Length of, 3423a.
Light wines, 6311c.
Light years, 442a.
Lignite, 1443c.
Liguest, Pierre Laclede, 3862b, 5161a.
Li Hung Chang, 3430c.
Likeri, Mount, 4511b.
Lilac, 3431a.
Lilac bud, 976b.
Liliuokalani, Lydia Kamekeha, 3431a.
Lille, France, 3431b.
Lille lace, 3290b.
Lily, 3431c.
Lily bulb, 989d.
Lily family, 856d.
Lily of the valley, 3431d.
Lima, O., 3433b.

Lima, Peru, 3432b.
Lima bean, 634a, 3432d.
Limburger cheese, 1291c.
Limburgers, 4122b.
Lime, 3433c.
Lime (fruit), 3433b.
Limelight, 3434a.
Limerick, 3434c.
Limerick, Ireland, 3434b.
Limestone, 988c, 3434d.
Limestone quarries, 4885d.
Limewater, 3434a.
Limitations, Statute of, 1725a.
Limited (business), 3168a.
Limited monarchy, 3882c.
Limited partnership, 4518d.
Limited veto, 6074d.
Limmat River, 6420b.
Limoges, France, 3435b.
Limon Bay, 4472a.
Limonite, 3435b.
Limousine, 514a.
Limpet, 3435c.
Limpopo River, 5863c.
*Lincoln* (Saint Gaudens), 1312b.
Lincoln, Abraham, 2019b, 3227a, 3436a, 4139c, 5510b.
Lincoln, Eng., 3435c.
Lincoln, Ill., 3446b.
Lincoln, Mount, 4155d.
Lincoln, Neb., 3446c.
Lincoln, Robert Todd, 3446a.
Lincoln, Thomas, 3436d.
Lincoln Cathedral, 1228c, 3436a.
Lincoln Highway, 3447a.
Lincoln Monument, Springfield, 2926c.
Lincoln ram, 5341b.
Lincoln's birthday, Program for, 3445c.
*Lincoln* statue in Newark, 4139c.
Lind, Jenny, 3448d.
Linden, 619a, 3449a.
Lindsay, Ont., 3449a.
Lindsey, Benjamin Barr, 3195d, 3449b.
Line, 3449d.
Linear leaf, 3361a.
Line engraving, 2058b.
Line formation (naval), 5678a.
Linen, 3449d.
Linen, Adulteration of, 63b.
Linen paper, 4480d.
Line of demarcation, 1752c.
Lines in the hand, 4464d.
Ling, 2750c.
Ling, Pehr Henrik, 3451a.
*Lingua Romana*, 3341a.
Link sausage, 5223c.
Linnaea, or twinflower, 3451a.
Linnaeus, 3451b.
Linne, Karl von, 3451b.
Linnet, 3451c.
Linoleum, 1582c, 3451d.
Linotype, 3452a.
Linseed oil, 3452c, 4447a.
Lintel, 318d.
Linters, 1607a.
Linton, William James, 3452d.
Linz, Austria, 3452d.
Lion, 3453a.
Lion, The (astronomy), 3382b.
Lion couchant, 2776d.
Lion dormant, 2776d.
*Lion of Lucerne*, 3520c, 5658d.
"Lion of the North," 5792a.
Lion passant, 2776d.
Lion rampant, 2776d.
Lion statant, 2777a.
Lippi, Filippo, 3455b.
Lippo Lippi, 3453b.
Lip reading, 1719d.
Lipton, Sir Thomas, 6379b.
Liquid, 3455c.
Liquid air, 3455d.
Liquidating partner, 4519b.
Liquid fire, 3456a.
Liquid measure, Table of, 1765a.
Liquids, Expansion of, 2113d.
Liquid sunlight, 4614b.
Liquorice, 3407b.
Liquors, 1810a.
Lira, 3456b.
Lisbon, Portugal, 3456c.
Lisgar, Sir John Young, 3457a.
Lisle, Rouget de, 3662d.
Lister, Sir Joseph, 3457b.
Listerine, 3457c.
List of the Presidents, 4812.
List of the Popes, 4757b.
Lists of stories, 5581a.
Liszt, Franz, 3457c.
Litany, 3457d, 5049a.
Litany River, 3364a.
Liter, 3458a, 3758b, 3759b.
Literary Club, The, 2529d, 3146c.
Literature, 3458a.
Literature, American, 227b.
Literature, Canadian, 1139a.
Literature for children, 3461a.
Litharge, 3356a.
Lithium, 3464b.
Lithography, 3464c.
Lithosphere, 1902d, 2435c.
Lithotomy, 3465b.
Lithuania, 3465b.
Litmus, 3465c.
Little blue darter, 2724a.
*Little Bo Peep*, 3317b.
*Little Boy Blue*, 230c, 3316d.
Little Bras d'Or, 897b.
Little chief hare, 4671d.
Little Church 'round the Corner, 4210a.
Little Dipper, 637d.
*Little Dorrit*, 1789d.
*Little Dutch Hero, A*, 5570d.
Little Egypt, 2922c.
Little Falls, N. Y., 3465d.
"Little Father," 4230b.
*Little Fishie in the Brook*, 3316b.
"Little Giant," 1845b, 3440b.
Little Manitoulin Island, 3633d.
*Little Match Girl, The*, 5580a.
Little Miquelon Island, 3839b.
*Little Miss Muffet*, 3317c.
Little neck clams, 1405d.
"Little Old Lady of Threadneedle Street," 574a.
Little Parliament, 590d.
Little pickerel, 4661b.
Little red spiders, 3866c.
"Little Rhody," 4995b.
Little Rock, Ark., 3466a.
Little Russians, 5113c, 5129b.
Little slam (in cards), 924d.
Little Sunda Islands, 5627a.
Little talent, 5689b.
Little torch, 4955d.
Littoral fishes, 6416b.
Liturgy, 3466d.
Liubotrn, Mount, 5311d.
Liutprand, King, 3487a.
Live-forever, 2852d.
Live load, 986c.
Live oak, 4323c.
Liver, facing 1388, 3467a.
Liver, cirrhosis of the, 1390c.
Liver fungus mushroom, 4014d.
Liverleaf, 2775c.
Livermore, Mary Ashton Rice, 3467c.
Liverpool, Eng., 3467d.
Liverpool, N. S., 3468b.
Liverpool & Manchester Railway, 5547d.
Liverpool of South Africa, 4767b.
Liverwort, 2775c, 3468c.
Live stock, 97a.
Live wires, 1991a.
Livingston, Robert R., 3896c.
Livingstone, David, 85d, 3468c, 5525c.
Livingstone, Rhodesia, 5002a.
Livonia, 3469d.
Livonia, Gulf of, 5018b.
Livre, 3469d.
Livy, Titus Livius, 3469d.
Lizard, 3470a.
Llama, 3470c.
Llaneros, 6047d.
Llaners, 3471a.
Llano estacado, 4172b.
Llanos, 3471a.
Lloyd-George, David, 2449c.
Lloyds, 3471b.
Llullailaco, Mount, 1331d.
Loaded dice, 1788d.
Loading, 64a.
Load on various roads, 5031b.
Loaf sugar, facing 5617.
Loam, 3471d, 5431c.
Loanda, Angola, 258c, 5165b.
Lobby and lobbying, 3471d.
Lobelia, 3472a.
Loblolly pine, 4677d.
Lobster, 3472c.
Lobworm, 3473c.
Local anesthetics, 253a.
Local government in Great Britain, 2589a.
Local government in the United States, 5975d.
Local option, 3473c.
Local taxation, 5713a.
Loch, 5259a.
Lochinvar, 3473d.
Lock, 3474a.
Lock (engineering), 1145c, 1146d.
Locke, David Ross, 3474c.
Locke, John, 3474c, 4266b, 5460d.
*Locked Box, The*, 4050a.
Lockhaven, Pa., 3475a.
Lockjaw, 3475b.
Lock Katrine, 3215d.
Lockport, N. Y., 3475d.
Lockwood, Belva Ann Bennett, 3476a.
Lockout, 5592d.
Lock stitch, 5328d.
Loco-foco, 3476b.
Locomotive, 3476c, 4920a.
Locomotor ataxia, 3479d.
Loco weed, 3480b.
Locris, 318a.
Locust, 1192a, 3481a.
Lode, 6045b.
Loder's gazelle, 2410c.
Lodestone, 3595b.
Lodge, Henry Cabot, 3482b.
Lodge of Perfection, 3681b.
Lodz, Poland, 3482b.
Loe, Thomas, 4562a.
Loeb, Jacques, 3482c.
Loess, 1888a, 3483a.
Lofoten Islands, 3483b, 4288d.
Log, 3483c.
Logan, John Alexander, 3483d.
Logan, Mount, 3484b, 5150a.
Logan, Stephen T., 3439b.
Logan, Utah, 3484c.
Loganberry, 3484d.
Logansport, Ind., 3485a.
Logarithms, 3485b.
Log book, 3483d.
Log-cabin and hard-cider campaign, 2705b.
Loggerhead shrike, 5364d.
Loggia, 3485d.
Logic, 3486a.
Log raft, 3533a.
Logwood, 3486a.
Lohengrin, 3486b.
Loire River, 3486c.
Lok, 3486d.
Loki, 4044c.
Loma Tina, 2662a.
Lombard plum, 4710b.
Lombards, 3487a.
Lombardy, 3487b.
Lombardy poplar, 4759c.
Lombroso, Cesare, 1638a.
Lomond, Loch, 3487c.
London, Eng., 3488a.
London, Jack, 3492c.
London, Ont., 3487c.
London, Tower of, 5850d.
London Bridge, 3490c.
*London Bridge* (game), 2376c.
London Company, 3492d.
London University, 3493a.
Lone Star State, 5767b.
Long, John Luther, 3493a.
Long Beach, Cal., 3493b, 3504b.
Long Branch, N. J., 3493c.

Long division, 1819b.
Long-eared sunfish, 5629c.
Longevity, 3419a.
Longfellow, Henry Wadsworth, 3494a.
Longfellow birthday programs, 3497a.
Longfellow Memorial at Cambridge, 3496b.
Longimus, 6410d.
Long Island, 3497d.
Long Island Sound, 3498a.
Longitude, 3498c.
Longitude and time, 3499a.
Longitudinal valleys, 6022c.
Long-leaf pine, 4677c.
Longman, Mary Evelyn, 4474b.
Long Narrows, 1692b.
Long Parliament, 1643c, 3500a.
Long primer type, 5930d.
Long session of Congress, 1538c.
Long's Peak, 867a.
Long splice, 5503d.
Long stair (Montessori Method), 3919c.
Longstreet, James, 3500c.
Long sword, 5666a.
Long-tailed weasel, 6228d.
Long ton, 5833d.
"Long" transactions, 787c.
Longueuil, Que., 3500d.
Long Walls, 454a, 4555b, 4632d.
Long whist, 6269c.
Loo-Choo, Archipelago, 3500d.
Lookout Mountain, 3501a, 5751c.
Loom, Modern, 6233d.
Loon, 1811c.
Looper, 3710c.
Loose constructionists, 5981d.
Loosestrife, 3547a.
Lop-eared rabbit, 4907a.
Lope de Vega, 6042a.
Lopevi, Island of, 4161c.
Lopez, F. Solano, 4488a.
Lopez, Narciso, 1660d.
Loquat, 3501b.
Lorain, O., 3501c.
Lord, 1876c.
Lord High Chancellor, 1266d.
Lord Mayor, 3707a.
Lord Protector, 1642d.
Lords, House of, 4508c.
Lord's Prayer, 3501d.
Lord's Supper, 2089a, 4522b.
Lorelei, 3502b, 4994b.
Lorikeet, 4513d.
Lorimer, George Horace, 3502c.
Loris, 3502c.
Lorraine, 213d.
Lory, 3502d, 4513d.
Los Angeles, Cal., 3503a.
Los Angeles aqueduct, 308a.
Lossing, Benson John, 3505c.
*Lost Chord, A*, 4831c.
*Lost Pleiad, The*, 5388a.
"Lost Provinces," 213d.
Lotbiniere, Sir Henri Joly de, 940a.
Loti, Pierre, 3505d.
Lotophagi, 3506d.
Lottery, 3505d.
Lotus, 3506a.
"Lotus City," 4525d.
Lotus-eaters, The, 3506d.
Loubet, Emile, 2305c, 3507a.
Lou Dillon, 4908d.
Loughs, 3046a.
Louis I, the Pious, 3511a.
Louis IX, XI, XII, XIII, XIV, XV, XVI, XVII, XVIII (France), 3507b.
Louisa, Auguste Wilhelmine Amalie, 3511b.
Louisburg, N. S., 3511b.
Louisburg, Sieges of, 3511c.
Louise, Lake, 3511d.
Louise Alberta, Marquise of Lorne, 161b.
Louisiana, 1459b, 3512a.
Louisiana Purchase, 3521a.
Louisiana Purchase Exposition, 3521d.
Louisiana State University and Agricultural and Mechanical College, 3522a.
Louis Philippe, 3522c, 4067b.
Louis Philippe Joseph, 4414c.
Louis the German, 3522d.
Louisville, Ky., 3523a.
Louisville and Portland Canal, 1147a.
Lourenço Marques, P. E. A., 1742d, 4785b.
Louse, 3524b.
Louvain, Belgium, 3524d.
L'Ouverture Toussaint, 5850a.
Louvre, Palace of the, 3525b.
Lovchen, Mount, 3912b.
*Love and Death*, 4452.
Love apple, 5832b.
Lovejoy, Elijah, 216b, 4639b, 6029b.
Lovely Lane Meeting House, 3756d.
Loveman, Robert, 233c, 3525d.
Low, Seth, 3526a.
Low Church party, 1375b.
Lowell, Abbott Lawrence, 3526b.
Lowell, James Russell, 3526d.
Lowell, Mass., 3528b.
Lowell of the South, 475c.
Lower barbarism, 1399d.
Lower Brule River Reservation, 5463b.
Lower California, 1070b.
Lower Canada, 1123a, 4386c, 4887a, 5940d.
Lower Carboniferous stage, 2440c.
Lower case type, 4823c.
Lower civilization, 1400c.
Lower Cretaceous stage, 2441b.
Lower course of a river, 5025b.
Lower Egypt, 1966c.
Lower Palatinate, 4457c.
Lower savagery, 1398b.
Lower Silurian Period, 4401d.
Lower Town, 4894d.
Lower Yellowstone Falls, 3904d.
Lower Yellowstone project, 3905d.
Lower Yukon District, 6404d.
Lowest temperature, 4726d.
Low German, 4703c.
Low German Bible, 4703d.
Low-head water power, 6219a.
Low license, 3405d.
Low mass, 3682a.
Low relief, 617c.
Low Saxon, 4703c.
Low tide, 5808b.
Loyal Order of Moose, 2318d.
Loyola, Saint Ignatius of, 3529a.
Lozenge tools, 6351c.
Lubeck, Germany, 2687a, 3529c.
Lubeck, Peace of, 5792a.
Lubeck, Principality of, 4367c.
Lucayos Islands, 543a.
Lucca, 3530a.
Lucerne (plant), 179d.
Lucerne, Lake of, 3530b.
Lucerne, Switzerland, 3520b.
Lu-Chu, Archipelago, 3500d.
Lucifer, 3530c, 6054a.
Lucin Cutoff, 2599a.
Lucknow, India, 2716a, 3530d.
Lucretia, 3531a.
Lucretius, Titus Carus, 3531a.
Lucy, Sir Thomas, 5333a.
Ludington, Mich., 3531b.
Ludwigshafen, Germany, 3531c.
Lugano, Lake of, 3531d.
Lugbait, 3473c.
Luggers, 2786d.
Lugworm, 3473c.
Luke, Gospel of, 2541c.
Luke, Saint, 3531d.
"Luke Sharp," 599a.
Lukuga River, 5697b.
Lulea, Lapland, 3332a.
*Lullaby of the Iroquois*, 3163b.
Lully, Jean Baptiste, 4389c.
Lumbago, 3532a, 4993b.
Lumbar vertebrae, 5398d.
Lumber, 3532a.
Lumbering and wood products in the United States, 5962c.
Lumber waste, 3533b.
Lumière process (photography), 4651a.
Luminous paint, 4447c.
Lumpfish, 3535b.
Lump jaw, 3535c.
Lumpsucker, 3535b.
Lumpy jaw, 3535c.
Luna, 3535d.
Lunacy, 3535d.
Lunar caustic, 1240a, 3536a, 5386a.
Lunar month, 3931b.
Lunatic, 3535d.
Lundy's Lane, Battle of, 3536b.
Lunenburg, N. S., 3536c.
Lung-books, 313d.
Lung capacity, 913a.
Lungly Island, 3839b.
Lungs, 3536c.
Lung tuberculosis, 5895d.
Lungwort, 3537d.
Lunula (physiology), 4056c.
Lupercalia, 3538a.
Lupine, 3538b.
Lupulin, 2833c.
Lupus, 3538b.
Luray Caverns, 1241d, 3538c.
*Lusitania*, 5356d, 6172a.
Lustracellulose, 1248a.
Lute, 3538c.
Lutecium, 1294d.
Lutetia (Paris), 4498c.
Luther, Martin, 3381d, 3538d, 3724a, 4958a.
Lutherans, 3540c.
Lutter, Battle of, 5813c
Lutzen, Battle of, 2643d, 3541a, 5892b.
Luxemburg, 3541b.
Luxemburg, House of, 791a.
Luxor obelisks, 4328b.
Luzon, 3542d.
Lvoff, Prince George E., 5123a.
Lyceum, 3542d.
Lycurgus, 3542d.
Lydia, 3543a, 4653a.
Lye (antidote), 282a, 1240a.
Lyell, Sir Charles, 3543b.
Lymph, 3543c.
Lymphatic glands, 3543d.
Lymphatic system, 3543c.
Lynch, Charles, 3544b.
Lynchburg, Va., 3543d.
Lynch law, 3544b.
Lynn, Mass., 3544c.
Lynx, 3545a.
Lyon, Mary, 3545b.
Lyons, France, 3545c.
Lyre, 3545d.
Lyre bird, 3546b.
*Lyrical Ballads*, 6357d.
Lyric poetry, 3546b.
Lysander, 3547a.
Lysias, 4529d.
Lysimachia, 3547a.
Lysimachus, 4880b.
Lysippus, 3547c.
Lyte, Henry Francis, 2895c.
Lytton, Edward Robert Bulwer, 3547c.
Lytton, Edward George, Earl Lytton-Bulwer, 996d.

# M

M, 3548a.
Maalzel, Johann, 3761a.
Maartens, Maarten, 3548a.
Mabie, Hamilton Wright, 3548b.
Mac, 1406b.
Macadam, 5029b.
MacAdam, John L., 5029b.
McAdoo, William G., 2861c.
McAlester, Okla., 3548d.
MacAlpin, Kenneth, 5261b.
Macaroni, 3549a.
Macassar, Dutch West Indies, 5875b.

Macaulay, Thomas Babington, 3549d, 3728a.
McAuley, Catherine, 3744c.
Macaw, 3550c.
Macbeth, 3550d.
McBride, Sir Richard, 940c, 3551b.
Maccabees, 3551c.
Maccabees of the World, Knights of, 3551d.
McCardle, Eliza, 3158a.
McCarthy, Justin, 3551d.
McClellan, George Brinton, 3552b.
McClelland, Robert, 4666b.
McClure, Sir Robert, 4280a.
McClure, Samuel Sidney, 3552c.
McClure, William, 4605c.
McCormack, John, 3552d.
McCormick, Cyrus Hall, 3553a.
McCutcheon, George Barr, 3553c.
McCutcheon, John Tinney, 1185c, 3553d.
McDermott, Lake, 2503a.
Macdonald, George, 3554a.
Macdonald, Sir Hugh John, 3554a.
Macdonald, James Alexander, 3554b.
Macdonald, Sir John Alexander, 1125d, 3554d.
Macdonald, John Sandfield, 3556c.
Macdonald, Sir William Christopher, 3557a.
Macdonough, Thomas, 4704c.
McDougall, William, 1125a, 3557a, 4954d.
MacDowell, Edward Alexander, 3557c.
McDowell, Irwin, 3556d.
MacDowell, Patrick, 5276d.
Mace (spice), 3558b.
Mace (staff), 3558a.
Mace, Jem, 4830c.
Macedonia, 477d, 3558b.
Macedonian foot, 2252a.
Macedonian phalanx, 4628b.
McGee, Thomas D'Arcy, 1143d, 3559a.
McGill, James, 3559c.
McGill College and University, 3559c.
McGillivray, Alexander, 3560a.
Macgregor, Donald, 5038b.
Machar, Agnes Maule, 3560b.
Machiavelli, Niccolò, 3560c.
Machine, 3560d.
Machine gun, 3562b.
Machine-made laces, 3290c.
Machinist's wrench, 6362b.
Machnow, 2489c.
Machpelah, Cave of, 2756d.
Machu Picchu, 2937a.
Maciejowice, Battle of, 3277c.
McIntyre, Mount, 54a.
Mack, Alexander, 1882b.
Mackay, John William, 3563c, 4138b.
Mackaye, Percy, 232c.
McKeesport, Pa., 3563d.
McKees Rocks, Pa., 3564a.
Mackenzie, 3564a.
Mackenzie, Alexander, 1126c, 3564b.
Mackenzie, Sir Alexander, 1142c, 3565a.
Mackenzie, Arthur Stanley, 3565c.
Mackenzie, Sir William, 3565d.
Mackenzie, William Lyon, 3566a, 4735d, 4947a.
Mackenzie Basin Indians, 2963d.
Mackenzie River, 3567a.
Mackerel, 3568a.
Mackerel, Methods of catching, 2188a.
Mackerel mint, 3838b.
McKim, Charles F., 6194b.
Mackinac Island, 3568d.
McKinley, Mount, 1565b, 3569c.
McKinley, William, 3569b.
McKinley tariff law, 1422b, 2698b, 3570c, 5704d.
Mackintosh, 5098c, 6220a.
Mackintosh, Captain E., 4730a.
Maclaren, Ian, 6223c.
Macleod, Alta., 3575a.
MacMahon, Maria Edme Patrice Maurice de, 3575b.
McMaster, John Bach, 3575c.
McMaster, William, 3575c.
McMicken, Charles, 1383b.
MacMonnies, Frederick, 3575d.
Macmurrough, Dermod, 3050c.
MacNab, Sir Allan Napier, 3576a, 4947d.
McNab's Island, 2666d.
Macon, Ga., 3576d.
Macon Act, 6141c.
Macro, 5805d.
Macula, 2118d.
Macular leprosy, 3384c.
Madagascar, 3577b.
"Madame Deficit," 3651b.
Madame de Pompadour, 4748b.
Madame de Stael, 5519b.
*Madame Le Brun and Her Daughter*, 4452.
*Madame Recamier*, 4452.
"Madame Veto," 3651b.
"Mad Anthony" Wayne, 6227d.
Madawaska River, 4429c.
Madder, 3578b.
Madeira Island, 3578c, 4782b.
Madeira River, 3578d.
Madeleine, Church of, 4497a.
Madero, Francisco, 3579a, 3772b.
Madison, Dolly, 3582a.
Madison, James, 3579b.
Madison, Wis., 3584c, 6330d, 6336c.
Madison River, 6390d.
"Madman of the North," 1278a.
Madonna and Her Babe, 3585c.
*Madonna della Scala*, 3586d.
*Madonna of the Burgomaster Meyer*, 3587b, 4452.
*Madonna of the Chair*, 3586c, 4452.
*Madonna of the Grand Duke*, 4452.
*Madonna of the Pomegranate*, 3587a.
*Madonna of the Rocks*, 3586d.
Madras (province), 804a, 3587d.
Madras, India (city), 3587c.
Madrepore coral, 1577b.
Madrid, Spain, 3588b.
Madrigal, 4020a.
Madroña, 317b.
Maecenas, 2835a, 6061a.
Maelstrom, 3588d, 6268b.
Maeterlinck, Maurice, 3589b.
Mafia, 3589b.
Mafra, Bight of, 2637c.
Magalhães, Fernão de, 3590c.
Magazine, 3589c.
Magazine, Mount, 364b.
Magdalen, Mary, 3677b.
Magdalena River, 3590a.
Magdalen Islands, 3589d.
Magdalen Tower, 2036a.
Madgeburg, Germany, 3590a.
Magellan, Ferdinand, 3590c.
Magellan, Strait of, 3590d.
Magerö Island, 4259c.
Maggiore, Lake, 3591a.
Maggot, 3336c.
Magi, 3591a.
Magic, 3591b.
Magic lantern, 5548b.
Magna Charta, 3593a, 3155b.
Magnesia, 3593d.
Magnesium, 3593d.
Magnesium limestone, 1834c.
Magnet and magnetism, 3594a.
Magnetic attraction, 469d.
Magnetic declination, 3595b.
Magnetic detector, 6322c.
Magnetic equator, 2067a.
Magnetic field, 3595a.
Magnetic induction, 3595a.
Magnetic iron ore, 3595c.
Magnetic needle, 3595c.
Magnetic poles, 3595a.
Magnetism, 3594a.
Magnetism of earth, 1904c.
Magnetism of iron, 3061a.
Magnetite, 3595c.
Magneto-electric machine, 3595d.
Magnificat, 3596a.
Magnifying glass, 3791b.
Magnitude, 3596a, 5528d.
Magnolia, facing 2224, 3596a.
Magog, Que., 3596c.
Magog River, 3731c.
Magpie, 3596c.
Magyars, 504d, 2872c, 3596d.
Mahabharata, 3597a, 4927c.
Mahan, Alfred Thayer, 3597b.
Mahanoy City, Pa., 3597d.
Maharajah, 2949d, 4925c.
Mahdi, 3597d.
Mahican Indians, 3875c.
Mahmud II, 3598a.
Mahmudieh Canal, 178c.
Mahmud Shevket Pasha, 3875a.
Mahogany, 3598b.
Mahrattas, 3598d.
Maia, 4707a.
Maiden blush apple, 297d.
Maidenhair, 3599a.
Maidenhair tree, 2495b.
Maiden Rock, 6336c.
Maid of Orleans, 3152d.
Maid of Saragossa, 5205d.
Maikal Range, 4118a.
Mail matter, Classes of, 4787a.
Mail-order houses, 68a.
Maine, 3599a.
*Maine, The* (battleship), 211b, 1464c, 5480b.
Maine, University of, 3607c.
Mainland Island, 5351c.
Main question, 4510a.
Main River, 3599a.
Mains, Sewerage, 5321d.
Mainspring, 6212b.
Maintenon, Francoise d'Aubigne, Marquis de, 3607c.
Mainz, Germany, 3608a.
Maipo, Mount, 5449d.
Maipo, Battle of, 5196d.
Mair, Charles, 1141d, 1143b, 3608b.
Maisonneuve, Paul de Chomedey, 3608d.
Maisonneuve, Que., 3608c.
Maize, 1584b.
Maize thief, 1649a.
Majesty, 3609a.
Majolica, 3609b.
Major, 3609c, 4929a.
Majorca Island, 3609d.
Major-general, 3609c, 4929a.
Major planets, 4695d.
Major premise, 4946a.
Major scale, 4026a.
Makaw Indians, 3609d.
Maker of a note, 4292b.
"Maker of Scotland," 5261d.
Makkah Indians, 3609d.
Makushin, Mount, 5937d.
Malabar itch, 3087a.
Malacca, 3610a, 5584a.
Malacca, Strait of, 3610b.
Malachi, 3610b.
*Malachi*, Book of, 3610b.
Malachite, 3610c, 3817d.
Maladetta, Mont, 4879c.
Malaga, Spain (city), 3610c.
Malaga (province), 2557d.
Malaga raisins, 4924d.
Malamutes, 1827c.
Malar, Lake, 5556b, 5646c.
Malar bones, 2123d, 2738d.
Malaria, 3610d.
Malaria germ, 3718c.
Malarial fever, 115c.
Malaria mosquito, 3967a.
Malaspina glacier, 3611c.
Malayan tapioca, 5700d.
Malay Archipelago, 3611d.
Malay Peninsula, 3612a.
Malay race, 4909c.

Malaysia, colored map, facing 4336.
Malden, Mass., 3612c.
Maldive Islands, 3612c.
Maldonado, Uruguay, 6006a.
Malibran, Maria Felicita, 2382b.
Malice, 3612d.
Malice prepense, 3636d.
Malignant tumor, 5900a.
Maligne Lake, 4506c.
Maligne River, 4506c.
Malines, Belgium, 3613a.
Malis, 318a.
Mall, The (Washington, D. C.), 6194b.
Mallard duck, facing 1872, 1873c.
Malleability, 3613b.
Mallein, 2505c.
Malleus, 1898d, 1899b.
Mallophaga, 3001a.
Mallore, Sir Thomas, 3614a.
Mallory, Stephen Russell, 3613b.
Mallow, 3613c.
Malmaison, 3175c.
Malmö, Sweden, 3614a.
Malory, Sir Thomas, 3614a.
Malt, 3614b.
Malta, Island of, 3614c.
Malta, Knights of, 3615a.
Malta terrier, 5764a.
Maltese cat, 1221b.
Maltese cross, 1646a.
Maltese point, 3290a.
Malting, 916c.
Malt vinegar, 6087d.
Malt whisky, 6268c.
Malvern Hill, Battle of, 3615a.
Mamelukes, 3615b.
Mammals, 3615c.
Mammal study, 4087d.
Mammary vein, 3181a.
Mammoth, 3616a.
Mammoth Cave, 772c, 3616c.
Mammoth Hot Springs, 6389d.
Mammoth Paint Pots, 6391c.
Man, 3617c.
Man, Isle of, 3618a.
Man, Myths explaining the making of, 4043b.
Management of prisons, 4827d.
Mana Ghat, Hill of, 4291a.
Managua, Lake, 4227a.
Mañana, 3765a.
Man and adaptation, 2061a.
Manäos, Brazil, 3618c.
Manasseh, 3175a.
Manasses of Bethulia, 3180a.
Manatee, 3618d.
Manchester, Eng., 3619a.
Manchester, N. H., 3620a.
Manchester Ship Canal, 3619d, 3748c.
Manchester Unity, 4341b.
Manchuria, 3620c.
Manchus, 1349a.
Mandalay, India, 3621b.
Mandamus, 3621c.
Mandan Indians, 3621d.
Mandarin, 3621d.
Mandarin orange, 4394b.
Mandatory injunction, 2994d.
Mandeville, Sir John de, 3622a.
Mandingo, 3622b.
Mandolin, 3622b.
Mandrake, 3622c, 3705a.
Mandrill, 3623a.
Man-eating tiger, 5810c.
Manet, Edouard, 2936d.
Manganese, 3623b.
Manganese bronze, 950b.
Manganese sulphate, 5620a.
Mange, 3623b.
Mango, 3106a, 3623c.
Mangrove, 3624a.
Mangue Canal, 5022c.
Mangum, Willie P., 6028d.
Manhattan bridge, 922a.
Manhattan Island, 3624c.
Mania, 2998a.
Manihot tree, 903b.
Manhole, 5322a.
Manila, P. I., 3624c.
Manila Bay, Battle of, 3625c.
Manila hemp, 3625b, 5078d.
Manila paper, 4480d.
"Man in the moon," 3941b.
Manistee, Mich., 3625c.
Manitoba, 3626a.
Manitoba, University of, 3630b.
Manitoba Agricultural College, 3630d.
Manitoba Lake, 3633b.
Manitou, 3633b.
Manitoulin, Lake, 2461c.
Manitoulin Islands, 3633c.
Manitowoc, Wis., 3633d.
Mankato, Minn., 3634a.
Manlius, 2535d, 5059a.
Mann, Horace, 3634c.
Manna, 3406c, 3635a.
Mannering, Mary, 3635b.
Mannheim, Germany, 3635c.
Manning, Henry Edward, 3635c.
Mannlicher rifle, 5017d.
Manoa, 1976d.
Man-of-war bird, 2339d.
Manon Jeanne Philipon, 5050d.
Mansard roof, 3635d, 5067b.
Manse, The Old, 2726b.
Mansfield, O., 3636c.
Mansfield, Richard, 3636a.
Mansfield Peak, 2618d.
Manslaughter, 3636d, 4008a.
Manta, 4486a.
Mantell, Robert Bruce, 3637a.
Mantis, 3637c.
Manua Islands, 5182a.
Manual training, 3637b.
Manuel, Juan, 5472c.
Manuel II (Portugal), 4784d.
Manufactures, Bureau of, 1512c.
Manufacturing in the United States, 5961c.
Manures, 3638d.
Manuscripts, 3639c.
Manutius, Aldus, 4870d.
*Man Without A Country, The*, 2664c.
*Man with the Hoe, The*, 3654c.
Manx cat, 1221b.
Manzanilla, 5351b.
Maori, 3640d, 4218b.
Map, 3641a.
Maple, 3642b.
Maple Creek, Sask., 3643b.
Maple Creek Antelope Reserve, 4506c, 4837a.
Maple Leaf, The, 3644a.
*Maple Leaf Forever, The*, 3643c.
Maple sugar, 5616a.
Map-making in school, 2426b.
Marabou, 3644b.
Marabou feathers, 56d.
Maracaibo, Lake, 6048c.
Maracaibo, Venezuela, 3644b.
Maracas Falls, 5880b.
Marajo Island, 3644c.
Marakanda, Turkestan, 5181c.
Marañon River, 220d.
Maraschino, 1692c.
Marat, Jean Paul, 1578c, 3644c.
Marathi, 3598d.
Marathon, 2167b, 3644d.
Marathon foot race, 4373b.
Marble, 3645a.
"Marble City," 5130a.
Marble quarries, 4886a.
Marbles, 3645d.
Marcellus, Claudius, 4337d.
Marcellus, Marcus, 4337d.
March, 3648a.
"Marches," Welsh, 6125c.
March hare, 2689d.
Marconi, Guglielmo, 3846c, 6325d.
Marco Polo, 1227d, 1349a, 4744b.
Marcos de Niza, 360c.
Marcus Antonius, 287a.
Marcus Aurelius, 478c.
Marcus Fabius Quintilianus, 4903d.
Marcus Porcius, 1231b.
Marcy, Mount, 54a.
Marcy, William L., 1403d, 4666b, 4738b, 5504c.
Mardi Gras, 3649b.
Mardonius, 2606b.
Mare Island, 3649c.
Marengo, Battle of, 3649c.
Marey, Etienne J., 3985d.
Margaret of Denmark, 4414a.
Margaret of Navarre, 4302d.
Margarita, Venezuela, 6048a.
Margarita Island, 6048c.
Marginal product, 6121a.
Margins, 787a.
Margins of leaves, 3361b.
Marguerite, 1690c.
Maria Christina, 182d, 3649d.
Maria Galante Island, 2630a.
Maria Louisa, 3650a.
Maria Theresa, 2687c, 3650b, 5610b.
Marichal de France, 3663d.
Marie Antoinette, Josephe Jeanne, 2336a, 3650d.
Marie of Luxemburg, 3542c.
Marie of Rumania, 5105c.
Marietta, O., 3651c.
Marietta mound, 3976c.
Marigold, 3651d.
Marigold window, 5083d.
Marine chronometer, 1372a.
Marine corps, 3652a.
Marine corps band, 5447a.
Marine glue, 2515b.
Marine oils, 4357b.
Mariner's chart, 1282a.
Mariner's compass, 1520d.
Mariner's stars, 5529a.
Marine soap, 1457d.
Marinette, Wis., 3652c.
Marion, Francis, 3653a.
Marion, Ind., 3653b.
Marion, O., 3653c.
Mariotte's law, 876a.
Mariposa grove, 5309d.
Maritime Provinces, 1100a, 4296a.
Marius, Caius, 1379b, 3653d.
Mark (coin), 3654b.
*Mark, Gospel of*, 2541c.
Mark, Saint, 3654b.
Mark Anthony, 287a, 1417b, 5060a, 5853a.
Markham, Edwin, 3654c.
Marking ink, 2995b.
Marking pencils, 4558a.
Marksmanship, 3654d.
Mark Twain, 1415c.
Marl, 3655c.
Marlboro, Mass., 3655c.
Marlborough, John Churchill, 3656a.
Marlowe, Christopher, 3656c.
Marlowe, Julia, 3656d.
Mar Menor Lagoon, 5473c.
Marmolata, Monte, 1835a.
Marmora, Sea of, 3657b.
Marmoset, 3657c.
Marmot, 3657d.
Marne, Battle of the, 3154d, 3658a, 4605d.
Marne River, 3657d.
Marooning, 968c.
Marque and reprisal Letters of, 3658b.
Marquee, 5758c.
Marquesas Islands, 3658c.
Marquette, Jacques, 3658d.
Marquette, Mich., 3659b.
Marquis, 1876c, 3659c, 4550b.
Marquis of Queensberry rules, 874a.
Marriage, 3659d.
*Marriage at Cana of Galilee*, 6070d.
Marriage by proxy, 4852b.
Marriage in the Roman Catholic Church, 5052b.
Marriage registration, 4962d.
Married people, Property rights of, 2879d.
Marryat, Frederick, 3661a.
Mars (astronomy), 3661d, 4695c.
Mars (mythology), 3661b.
*Marseillaise, The*, 3662d.

The letters a, b, c, d, following page numbers indicate first, second, third or fourth quarters of page.

Marseilles, France, 3663b.
Marshal, 3663d.
Marsh bird's-foot, 5873a.
Marshall, John, 3401a, 3664a.
Marshall, Tex., 3665a.
Marshall, Thomas Riley, 3664d.
Marshalltown, Ia., 3665b.
Marsh-arum, 1072b.
*Marshes of Glynn*, 3328c.
Marsh hawk, 2723d, 3665d.
Mars Hill, 3665d.
Marsh mallow, 3666a.
Marsh marigold, 1619d, facing 2224.
Marsh rosemary, 5083a.
Marston Moor, 3666b.
Marsupials, 486d, 3666b.
Marten, 3666c.
Marthas Vineyard, 3667a.
Martial, 2063d, 3667b.
Martial law, 3667b.
Martigny, Switzerland, 5146d.
Martin, 3667d.
Martin V, 4757a.
*Martin Chuzzlewit*, 2922c.
Martine, James E., 6303b.
Martingale, 2691d.
Martinique Island, 3668a.
Martinsburg, W. Va., 3668b.
Martin's Ferry, O., 3668c.
Martyr, 3668d.
Marvel of Peru, 2279b.
"Marvelous Crystal Hills," 6274c.
Marx, [Heinrich] Karl, 3669a.
Mary, Queen of Scots, 865a, 2013a, 3677b.
Mary, The Virgin, 3669d.
Mary I, II (England), 3669b.
*Mary Barton*, 2404c.
Maryland, 562c, 3670a, 4281a.
Mary Magdalene, 3677b.
Mary Stuart, 865b, 3677b.
Masaccio, 4449a.
Mas-a-Fuera Island, 3178a.
Mas-a-Tierra Island, 3178a.
Mascagni, Pietro, 1240c, 3678a.
Masculine gender, 2415a.
Masefield, John, 3678b.
Mash, 1810a.
Mashonaland, 3678d, 5002b.
Mask, 3679a.
Mason, James Murray, 3679d.
Mason, J. C. B., 3985b.
Mason, John, 4579d.
Mason, John Y., 4422b, 4738b.
Mason and Dixon's Line, 1822d, 3679b, 4570d.
Mason and Slidell, 3411d, 3679c.
Mason bee, 656b.
Mason City, Ia., 3680a.
Masonic degrees, 3680d.
Masonry, 3680b.
Mason's hygrometer, 2892d.
Masque, 3681c.
Mass (physics), 3878b.
Mass (religion), 3681d.
Massachusetts, 3606d, 3682a.
Massachusetts Bay Colony, 3691a.
Massachusetts Institute of Technology, 3691b.
Massacre of Fort Mims, 2271a.
Massacre of Raisin River, 4924c.
Massacre of Saint Bartholomew's Day, 5145c.
Massage, 3691d.
Massasoit, 3692a.
Massecuite, 3876c, 5615b.
Massena quail, 4883c.
Massenet, Jules Émile Frederic, 3692b.
Masseur, 3692a.
Masseuse, 3692a.
Massillon, O., 3692b.
Massive, Mount, 1486a.
Masters, Edgar Lee, 3692c.
Mastersingers, 3693a.
Mastication, 3693b.
Mastiff, 3693b.
Master Mason, 3681a.
Masters (guilds), 2636a.
Mastodon, 3693d.
Mastoid process, 1898d.
Masurian Lakes, 2798b, 6158b.
Matabele, 3694a.
Matabeleland, 5002b.
Matador, 994a.
Matanzas, Cuba, 3694a.
Matanzas River, 5144d.
Matapedia River, 4979a.
Matariah, Egypt, 2763a.
Matched boards, 3534c.
Matches, 3694b.
Matches, Antidote for poison from, 282a.
Match play (golf), 2531a.
Maté, 3695c.
Mate (of vessel), 3695c.
Materialism, 3695d.
Materials for nature study, 4086c.
Materiâ medica, 3696a.
Mathematical geography, 2424d.
Mathematical symbols, 5668d.
Mathematics, 3696a.
Mathematics of taxes, 5714a.
Mather, Cotton, 3698a.
Mather, Increase, 3697d.
Matilda, Queen, 5546d.
Matilya poppy, 4760d.
Matochkin Shar, 4301c.
Matrix (physiology), 4056b.
Matrix (printing), 5549d, 5930c.
Mattagami River, 3944c.
Mattamuskeet Lake, 4261b.
Mattamuskeet Out Fall Canal, 1147a.
Matteawan, N. Y., 632c.
Matter (mind), 3815a.
Matter (physics), 3698c.
Matterhorn, 3698d.
*Matthew, Gospel of*, 2541c.
Matthew, Saint, 3699a.
Matthews, James Brander, 3699b.
Matthew Strait, 4301c.
Matthias, 2873a.
Matthieu II, 3932a.
Mattoon, Ill., 3699b.
Mattra, Arabia, 4010c.
Mauchberg, Mount, 5863b.
Maud S, 4908d.
Maugerville, N. B., 4146b.
Maui Island, 2717b.
Mauna Kea, 3699c.
Mauna Loa, 3699d.
Maundy Thursday, 3699d.
Maupassant, Henri René Albert Guy de, 3700a.
Maurepas Lake, 4751c.
Mauretania, 3954a.
*Mauretania*, The, 5354a.
Mauritania, 81d.
Mauritius Island, 3700b.
Mauser rifle, 5017c.
Mausoleum, 3700d.
Mavor, James, 3700d.
Mawenzi, Mount, 3238c.
Max, Cornelius, 4455a.
Maxim, Hudson, 3701b.
Maximian, 1798c.
Maximilian (Austria), 3701b.
Maximilian I (H. R. E.), 3701c.
Maximilian II (H. R. E.), 3701d.
Maximite, 3701b.
Maxim machine gun, 3562c.
Maximus, 5785a.
Maxwell, James Clerk, 6325b.
May, 3704a.
Mayaguez, Porto Rico, 4773b, 4774d.
Maya Indians, 1253c, 3704d.
May apple, 3622d, 3705a.
May baskets for kindergartens, 3245a.
May beetle, 1454d, 3188d.
May bug, 1454d.
May day, 3704b.
*Mayflower*, The, 3705a, 4712c, 4713d.
"Mayflower of Plymouth," 1616a.
*Mayflower* roster, 3705b.
May fly, 3706a.
Mayhem, 3706a.
Mayo, Charles Horace, 3706b.
Mayo, Henry T., 6304d.
Mayo, William James, 3706b.
Mayo Foundation, 3835d.
Mayor, 1515b, 3706c.
Mayor, James, 1143d.
Mayor of the palace, 4578c.
Mayotte, 81d.
Maypole, 3704b.
Maypop, 4521d.
May queen, 3704b.
Mayweed, 1265a.
Mazama, Mount, 4404b, 4504b, 6112a.
Mazarin, Jules or Julius, 3707b.
*Mazarin Bible*, 2143d, 2644c.
Mazda, 1990d.
Mazeppa, Ivan Stefanovitch, 3707c.
Mazzini, Giuseppe, 3707d.
Mead, 2153d.
Meade, George Gordon, 3708b.
Meade, Larkin G., 5510b.
Meadow lark, 3708c.
Meadow lily bud, 976b.
Meadow sage, 5140b.
Meadowsweet, 5500d.
Meadow violet, 6088d.
Meadville, Pa., 3708d.
Meaford, Ont., 3709a.
Mealies, 1167d.
Meals, How to plan, 2244d.
Mealy bug, 3709b.
Measles, 3709c.
*Measure for Measure*, 3710a.
Measurement of intelligence, The, 3007b.
Measurement of water power, 6218d.
Measurements in Europe, 2095a.
Measures, 4024a.
Measures and time (music), 4024a.
Measures for crops, 1666b.
Measuring paper, Table for, 1765d.
Measuring results of education, 1933b.
Measuring scale for handwriting, 1936a.
Measuring worm, 3710c.
Meat, How to can, 2251b.
Meat and meat packing, 3710b.
Meat breeds (poultry), 4800a.
Meatless days, 6177b.
Meats, adulteration of, 62d.
Meats, How to buy, 2818d.
Meat saw, 5227b.
Mecca, Arabia, 3714b.
Mechanical advantage of a pulley, 4867c.
Mechanical advantage of a screw, 5270b.
Mechanical dentistry, 1769a.
Mechanical mixture, 1296b.
Mechanical powers, 3714c.
Mechanic arts, 390c.
Mechanics, 3714d.
Mechlin, Belgium, 3613a.
Mechlin lace, 3290b.
Mecklenburg Declaration Monument, 4263d.
Mecklenburg Declaration of Independence, 1280d, 3714d.
Mecklenburg-Schwerin, 3715a.
Mecoptera, 3001a.
Medal, 4311c.
Medal play (golf), 2531a.
Medea, 3715c.
Medellin, Colombia, 1476c.
Medford, Mass., 3715d.
Medford, Ore., 3716b.
Media, 3716c.
Medial moraine, 3945a.
Median basilic vein, facing 1388.
Median cephalic vein, facing 1388.
Medical inspection of schools, 5243d.
Medical schools, 3716d.
Medical superstitions, 5636b.
Medical therapeutics, 5785b.
Medicated soaps, 5424c.
Medici (family), 3717b.
Medicinal plants, 3717d.

Medicine, Father of, 2142a.
Medicine, Flowers in, 2225c.
Medicine and drugs, 3718a.
Medicine and surgery in moving pictures, 3986b.
Medicine Hat, Alta., 154b, 3721c.
Medicine man, 2965b.
Medieval England, 2044a.
Medieval history, 2801d.
Medill, Joseph, 4187b.
Medina, Arabia, 2758d, 3721d.
Medina Sidonia, Duke of, 373b.
Mediterranean Sea, 3722b, 4643d.
Medium, 3723a, 5501b.
Medium-head water power, 6219a.
Medjidie, 1468c.
Medulla oblongata, 892b.
Medusa, 3723a, 4591a.
Medusae, 3723a, 4746c.
Medusa's Head, 198b.
Meerschaum, 3823b, 4681c.
Meerut, India, 5306a.
Megaera, 2353a.
Megalossaurus, 1798b.
Megantic, Lake, 4888d.
Megantic, Que., 3723c.
Megaphone, 3723c.
Megara, 2780a.
Megaris, 318a.
Mehemet Ali, 1970c, 5912d.
Meikle, Andrew, 5800d.
Meilhac, Henri, 2665d.
Meissonier, Jean Louis Ernest, 3723d.
Meistersingers, 3693a.
Mejerda River, 5900b.
Mekka, Arabia, 3714b.
Mekong River, 1076a, 3724a.
Melancholia, 2998a.
Melanchthon, Philip, 3724a.
Melanesia, 3724c, 4336b.
Melba, Nellie, 3724d.
Melbourne, Australia, 3725a.
Melbourne, Lord, 6079b.
Meleager, 279b.
Melfort, Sask., 3725c.
Melilot, 3725d.
Melinite, 2115a.
Melo, Uruguay, 6007a.
Melodic minor scale, 4030c.
Melodrama, 3726a.
Melon, 3726a.
Melon pawpaw, 4532c.
Melos, Island of, 3726b.
Melpomene, 4012b.
Melrose, Mass., 3726b.
Melting point, 3726c.
Melting-pot, 504b.
Melville, Lake, 2676c.
Melville, Sask., 3726c.
Melville Island, 3726d.
Melville Peninsua, 3727a.
Mem, 3548c.
Membership, Stock exchange, 5555d.
Membranes, 3727a.
Membranous croup, 1647d.
Memling, Hans, 3727c.
Memnon, 3727d.
Memorial day, 1736b.
Memorizing, 3720a.
Memory, 3728a.
Memphis, Egypt, 3730a.
Memphis, Tenn., 3730b.
Memphremagog, Lake, 3731b, 4888d.
Menam River, 5367a.
Mendana, Alvaro, 5437a.
Mendelsohn - Bartholdy, Jakob Ludwig Felix, 3731c.
Mendicant Orders, 3732c.
Mending, 5328a.
Mendota Lake, 3585a, 6331d.
Mendoza, Argentina, 3732d.
Menelaus, 3732d.
Menelik, 17b.
Mengo, Uganda, 5935b.
Menhaden, 3733a.
Meningitis, 3733b.
Mennonite Brethren of Christ, 3734a.
Mennonitis, 3734a.
Menocal, Mario G., 1661b.
Menominee, Mich., 3734b.
Menominee Indians, 3734a.
Menominee River, 3813b, 6331d.
Mensuration, 3734c.
Mental aberration, 10a.
Mental activities, Development of the, 4547b.
Mental habits, 2741d.
Mental handicaps, 3736d.
Mentally deficient children, 3738c.
Mental powers, Development of, 4861a.
Mental scar, 4859c.
Mental therapeutics, 5785b.
Mentha, 3838b.
Menthen Treaty, 4783c.
Mentor, 3739c.
Mephistopheles, 3739d.
Merak, 443c.
Mercator, Gerard, 3739d.
Mercator's projection, 2426b, 3641d, 3740a.
Mercedes, Uruguay, 6007a.
Merced River, 6397b.
Mercer, John, 3740a.
Mercerizing, 64a, 1607a, 3028a, 3740a.
Merchant marine, 3740b.
Merchants' guilds, 2635d.
Mercier, Cardinal, 6156a.
Mercier, Honoré, 3742a.
Mercredi, 6238b.
Mercuric chloride, 3742d.
Mercuric sulphide, 3742d.
Mercurous chloride, 3742d.
Mercury (astronomy), 3743a, 4695c.
Mercury (metal), 3742c.
Mercury (mythology), 3744a, 4050b.
Mercury, Bichloride of, 1596d.
Mercury, Transit of, 5859c.
Mercury as medicine, 3719d.
Mercury interrupter, 6323d.
Mercury vapor lamp, 1991b.
Mercy, Sisters of, 3744c.
Mercy seat, 5673d.
Mer de Glace, 213b, 3744d, 3911a.
Meredith, George, 3744d.
Meredith, Sir William Ralph, 3745b.
Merenpthah, 4617b.
Merganser, 3745c.
Mergenthaler, Ottmar, 3452b.
Merici, Angela, 6005d.
Merida, Mexico, 3746a.
Merida, Venezuela, 6048a.
Meriden, Conn., 3746b.
Meridian, 3746c.
Meridian, Miss., 3747a.
Meridian of Greenwich, 5815b.
Meridian Road, 5032d.
Merimée, Prosper, 3747b.
Merino ram, 1234c, 5341d.
Merino sheep, 5342a.
Merit system, 1404a.
Merlin, 3747c.
Merlon, 1218d.
Mermaid and merman, 3747c.
Mermaids' purses, 5397d.
Meroë, Egypt, 2084b.
Merom, Lake, 3172d.
Merope, 4707a.
Merovaeus, 3747d.
Merovingians, 3747d.
*Merrimac*, The, 3890b, 5480d.
Merrimac River, 3748a.
Merry del Val, Rafael, 3748b.
Mersey River, 3748c.
Mertens, Franz, 3537d.
Merthyr Tydfil, Wales, 3748c.
Merv, 3748d.
Mesa, 3749a, 4701d.
Mesaba Range, 3829a.
Mesa Encantado, 3749a.
Mesa Verde, 3749a.
Mesa Verde National Park, 4504d.
Mesha, 3867c.
Meshhed, Persia, 3749a.
Mesmer, Friedrich Anton, 2896d, 3749b.
Mesmerism, 3749c.
Mesopotamia, 3749c.
Mesozoic Era, 2440d, 3749d.
Mesquite, 3749d.
Messene, Greece, 3750a.
Messenia, 318a, 3750a.
Messiah, 3750b.
*Messiah, The*, 2682d.
Messianic prophecy, 3750b.
Messianic times, 3750b.
Messina, Sicily, 3750c.
Messina, Strait of, 3750d.
Messines, Belgium, 6163d.
Mestizos, 4468b, 4600b, 5179d.
Metac, 3762a.
Metacarpals, 2681a, 5399d.
Metacomet, 3258a.
Metal buttons, 1029a.
Metal in minor coins, 3886c.
Metallic minerals, 3816c.
Metallic zinc, 6412a.
Metallurgy, 3750d.
Metals, 3751c.
Metals of the United States, 5955a.
Metamorphic rocks, 2436a, 3752a.
Metamorphism, 3751d.
Metamorphosis, 2999d, 3752a.
Metaphor, 3752d, 4598b.
Metaphysics, 3753a.
Meta River, 4413c.
Metatarsals, 2253a, 5399d.
Metaurus River, Battle of, 2167b.
Metcalfe, Charles Theophilus, Baron, 3753b.
Metchnikoff, Elie, 3753d.
Meteoric showers, 3755b.
Meteorological Service of Canada, 6232a.
Meteorology, 3754b.
Meteors, 3755a.
Meter (poetry), 3755c.
Meter, Electric, 1994a.
Meter signature, 4024b.
Methane, 2887d.
Methodism, Beginnings of, 6246a.
Methodist Episcopal Church, 3756c.
Methodist Protestant Church, 3756d.
Methodists, 3756b.
Methods of vocational guidance, 6105b.
Methuen, Mass., 3757b.
Methylated alcohol, 6350b.
Methylated spirit, 6353b.
Metis (half-breeds), 1125a, 1127a, 4954d.
Metis (mythology), 3190c, 3819a.
Metonymy, 3757c.
Metopes, 217a.
Metrical feet, 3755c.
Metric and English measurements compared, 3760a.
Metric system, 3757d.
Metric tables, 3759c.
Metronome, 3761a.
Metropolitan district, N. Y., 4205d.
Metropolitan Life Building, 4208c.
Metropolitan Museum of Art, 3761b.
Metternich, Clemens Wenzel Nepomuk Lothar, 3761c.
Metz, Germany, 3761d.
Meuse River, 3762a.
Mexican jumping beans, 3185d.
Mexican national hymn, 2894a.
Mexican national palace, 3770a.
Mexican onyx, 4388a.
Mexican opuntia, 1039b.
Mexican palmetto, 4463a.
Mexican plot, 6173a.
Mexican plow, 4709c.
Mexican War, 3762b, 4738d, 5718b.
Mexico, 3765a, 5992c.
Mexico, Gulf of, 3774d.
Mexico City, 3775c.
Mexitl, 3771a.

Meyer, Hans, 3238c.
Meyerbeer, Giacoma, 3777b.
Mezzo forte, 4021d.
Mezzo piano, 4021d.
Mezzo-rilievo, 3777c.
Mezzotint, 2058d, 3777c.
Miami, Fla., 3777d.
Miami and Erie Canal, 1147a, 4352a.
Miami and South New River Canal, 1147a.
Mica, 2563c, 3778a.
Mica schist, 3778b.
Michael, Grand Duke, 5122d.
Michael, Saint, 3778c.
Michaelmas, 3778c.
Michaelmas daisy, 434d.
Michelangelo Buonarroti, 3778d.
Michelet, Jules, 3780a.
Michelson, Albert Abraham, 3780c.
Michigan, 3780b, 4281b.
Michigan, Lake, 2596a, 3789c.
*Michigan*, The, 6182b.
Michigan, University of, 3790c.
Michigan Central Station, Detroit, 3785d.
Michigan City, Ind., 3790d.
Michilmackinac, 3568d.
Micmac Indians, 199b, 4296b.
Microcline, 2150b.
Micrococcus, 537d.
Microgram, 3759c.
Micrometer, 3791a.
Micrometer screw, 5270c.
Micronesia, 3791b, 4336b.
Microphone, 5738a.
Microscope, 3791b.
Microscopy, Results of, 3792c.
Midas, 3792d.
Middle Ages, 3793a.
Middle barbarism, 1400a.
Middle civilization, 1401a.
Middle degree of latitude, 3342b.
Middle Devonian series, 2440a.
Middle ear, 1898d.
Middle English, 2051c.
Middle savagery, 1399b.
Middlesbrough, Eng., 3793a.
Middlesex Falls, 3726b.
Middle tint, 3777c.
Middleton, Sir Frederick Dobson, 3793b.
Middletown, Conn., 3793c.
Middletown, N. Y., 3793d.
Middletown, Ohio, 3794a.
Middlings, 2222a.
Middy blouse, 5327a.
Midhat Pasha, 3875a.
Midian, 3962d.
Midland, Ont, 3794b.
Midshipman, 1040a, 4091b.
Midshipman's butter, 206c.
*Midsummer Night's Dream*, facing 1854, 3794c.
Midway Plaisance, 1312c, 6359c.
Mieczyslaw I, 4722d.
Miette Hot Springs, 4506c.
Mignonette, 3794d.
Migration of animals, 261b.
Migration of birds, 740b.
Mikado, 3795a.
Mikhailovitch, Czar Alexius, 4606c.
Milan, Italy, 3795b.
Milan Decree, 3796a, 6140b.
Milano, Italy, 3795b.
Mildew, 3796b.
Mile, 3796c.
Miles, Nelson Appleton, 3796d.
Miles City, Mont., 3797a.
Miletus, Asia Minor, 3797a.
Milford, Mass., 3797b.
Militant suffragism, 4477c.
Military Academy, United States, 3797b.
Military attaché, 466b.
Military bands, 570b.
Military camps in Canada, 1132c.
Military Conscription Act, British, 6115b.
Military districts, Canada, 1130b.
Military districts, United States, 6178a.
Military engineer, 2033d.
Military hospitals, 2846c.
Military hygiene, 2892a.
Military insignia, United States, 5940a.
Military instruction in schools, 3800c.
Military law, 3667b.
Military oaths, 4326c.
Military parole, 4512c.
Military preparedness, 3799a.
Military salvage, 5180a.
Military schools, 3800d.
Military telephone, 5740d.
Military tribunes, 5878a.
Military watchword, 4512c.
Militia, 3801a.
Militia, Canadian, 1130a.
Milk, 3802a.
Milk, Adulteration of, 62b.
Milk (god), 4644d.
Milk a unique food, 4318a.
Milk of lime, 3434a.
Milk of magnesia, 3593d.
Milk peptones, 4579c.
Milk River, 155b.
Milk River project, 3905d.
Milk snake, 3805a.
Milk teeth, 5728c.
Milk warmer, Electric, 1988c.
Milkweed, 3805a.
Milky Way, or Galaxy, 3805c, 4707a.
Mill, James, 3805d.
Mill, John Stuart, 3806b.
*Mill, The*, 4452.
Millais, Sir John Everett, 3806c.
Millennium, 3806d.
Miller, Cincinnatus Heine, 3807a.
Miller, Joaquin, 3807a.
Miller moth, 3970c.
Miller's thumb, 5271d.
Millet, 3807c.
Millet, Jean François, 255a, 3808a.
*Mill on the Floss*, 2011b.
Mills Bill, 1422a.
Mill teeth, 5728d.
Millville, N. J., 3808d.
Milner, Alfred, 3809a.
Milo, Island of, 3726b.
Milreis, 903d, 3809b.
Miltiades, 3645a, 3809c.
Milton, John, 3809c, 4484c.
Milton, Mass., 3811a.
Milwaukee, Wis., 3812a.
Mimeograph, 3813d.
Mimeoscope, 3814b.
Mimicry, 3814b, 4845b.
Minaret, 1045a, 3814b.
Minas Bay, 3814d.
Mind, 3815a, 4547b.
Mindanao Island, 4630b.
Mind and body, Relation of, 4547b.
Mind-cure, 3418c.
Mind reading, 3815b.
Mine, 4885a.
Mine laying, 5605b.
Mineral cotton, 3818d.
Mineral fuels of the United States, 5955d.
Mineral oils, 4357b.
Mineral paints, 1353d.
Mineral Range, 3782c.
Minerals and mineralogy, 3815d.
Minerals of the United States, 5954b.
Mineral springs, 5509b.
Mineral substances in food, 4318b.
Mineral tar, 425c.
Mineral waters, 3818c.
Mineral wool, 3818d.
Minerva, 3819a.
Mine shaft, 1446b.
Ming dynasty, 1349a.
Minie rifle, 5017b.
Minimum age in labor, 3285a.
Minimum wage, 3819c.
Mining, 3820a.
Mining operations in Canada, 3821b.
Mining operations in the United States, 3820d.
Minion type, 5930d.
Minisink Indians, 4006b.
Minister of Agriculture (Canada), 1115b.
Minister of Finance (Canada), 1115b.
Minister of Inland Revenues (Canada), 1115c.
Minister of Interior (Canada), 1115c.
Minister of Justice (Canada), 1115b.
Minister of Labor (Canada), 1115c.
Minister of Marine and Fisheries (Canada), 1115b.
Minister of Militia and Defense (Canada), 1115c, 1130b.
Minister of Mines (Canada), 1115d.
Minister of Public Works (Canada), 1115c.
Minister of Railways and Canals (Canada), 1115c.
Minister of Trade and Commerce (Canada), 1115b.
Ministers, Foreign, 222b, 1800c.
Ministry, 3823b.
Ministry of Canada, 1114d.
Mink, 3823d.
Minneapolis, Minn., 2222c, 3824a.
Minnedosa, Man., 3826c.
Minnehaha, 2790c.
Minnehaha Falls, Minn., 3825a.
Minnesingers, 3826c.
Minnesota, 3827a.
Minnesota, University of, 3835c.
Minnesota River, 3836a.
Minnetonka, Lake, 3825b.
Minnewaukan, 1781a.
Minorca, Island of, 3836b.
Minor premise, 4946a.
Minor scale, 4029d.
Minos, King, 3836b, 4991b.
Minos's Bull, 3836d.
Minot, N. D., 3836c.
Minotaur, 3836d, 5788d.
Min River, 2345c.
Minsk, Russia, 3837a.
Minshull, Elizabeth, 3811a.
Minstrel, 3837b.
Minstrelsy, Modern, 3837c.
Mint (institution), 3837c.
Mint (plant), 3838a.
Mintha, 3838b.
Minto, Gilbert John Murray Kynynmond Elliot, 3838b.
Minuet, 1697a.
Minuit, Peter, 3624c, 3838c.
Minute, 3838d.
Minutemen, 3839a.
Miocene Period, 3839a.
Miquelon Island, 3839b.
Mirabeau, Gabriel Honore Riqueti, 3839c.
Mirabilite, 2511a.
Miracle, 3839d.
Miracle play, 1854c, 3840a.
Miraflores Locks, 4472d.
Mirage, 3840b.
Miramichi River, 3841a.
Miranda, Count de, 4238c.
Mire-drum, 754c.
Miriam, 3962c.
Mirror, 3841b.
Mirror carp, 1192d.
Mirs, 5116c.
Misdemeanor, 3842a.
Miseno, Cape, 4062c.
Misery, Mount, 5147d.
Mishawaka, Ind., 3842d.
*Mishna*, 2755a, 5693b.
*Missal*, 916b, 3843a.
Missi dominici, 1274a.
Missinaibi River, 3944c.
Missionary journeys of Paul, 4529c.

Missionary Ridge, Battle of, 1284c.
Mission olive, 4370b.
Missions and missionaries, 3843b.
Missions of California, 1066d.
Missisagi Forest Reserve, 4382c.
Mississippi, 3844a.
Mississippi, University of, 3850c.
Mississippi Bubble, 3854a.
Mississippi Industrial Institute and College, 1505d.
Mississippi jetties, 3147b.
Mississippi levee districts, 3391d.
Mississippi River, 3831b, 3850d.
Mississippi Scheme, 3854a.
Missoula, Mont, 3854b.
Missouri, 3854b.
Missouri, University of, 3863b.
Missouri Botanical Garden, 5159a.
Missouri Compromise, 3863c, 3898c.
Missouri Coteau, 1097a.
Missouri Falls, 3904d.
Missouri River, 3851a, 3863d.
Mist, 2240d.
Mistletoe, 859b, 3865a.
Mistral, Frederic, 4848c.
Mitchel, John Purroy, 5695b.
Mitchell, Donald Grant, 3865b.
Mitchell, John, 3865c.
Mitchell, Mount, 293c, 4267a.
Mitchell, Silas Weir, 3866a.
Mitchell, S. D., 3866b.
Mites, 3866c.
Mithridates, 3867a.
Mitrailleuse, 3563b.
Mitral valve, 2745c.
Mitre shell, 5344c.
Mittel Europa, 6153c.
Mixed diet, 2244b.
Mixed metaphor, 3753a.
Mixed numbers, 2285d.
Mixtecas Indians, 3766d.
Mizar, 443d, 1844a.
Mnemonics, 3729b.
Moab, 3867b.
Moab, Plain of, 1717b.
Moabites, 3867b.
Moabite Stone, 3867c.
Moat, 1218d.
Moberly, Mo., 3867d.
Mobile, Ala., 3868a.
Mobile Bay, Battle of, 3868d.
Mobile pecan, 4546b.
Mobile River, 3869b.
Moccasin flower, 3869b.
Moccasin snake, 3869c.
Mocha, Arabia, 5910b.
Mocha coffee, 1464c.
Mocking bird, 3869d.
Mode, 3870b, 6057a.
Modena, Italy, 3870d.
Moderato, 4026a.
"Modern Athens," 456c.
"Modern Babylon," 4205a.
Modern English, 2051c.
Modern history, 2802a.
Modern Knights Templars, 5746a.
Modern Olympian games, 4373a.
Modern operas, list of, 4390a.
*Modern Painters*, 5110d.
Modern siege methods, 5374b.
Modern tendencies in education, 1938a.
Modjeska, Helena, 3871a.
Modoc Indians, 3871b.
Modoc War, 4410a.
Modred, 398c.
Moe, Jörgen, 408b.
Mogul, 3889d.
Mohacs Field, Battle of, 2873a, 5438b.
Mohair, 2518a, 3871c.
Mohammed, 3714b, 3721d, 3871d.
Mohammed II, 5912a.
Mohammed V, 3874d.
Mohammedan Architecture, 3872d.
Mohammedan calendar, 1052d.
Mohammedanism, 3873a.
Mohammedan year, 6385c.
Mohammed Shah, 4595c.
Mohave Desert, 1068c.
Mohave Indians, 3875a.
Mohawk Indians, 3875b.
Mohawk River, 3875b.
Mohegan Indians, 3875d.
Mohican Indians, 3875c.
Moissan, Henry, 2230b.
Moki Indians, 2832a.
Mok-po River, 1364b.
Molar teeth, 5728c.
Molasses, 3876a.
Mold, 3876d.
Moldavia balm, 561c.
Mole, 3877a.
Mole cricket, 1634d, 3877d.
Molecular force, 3878b.
Molecular weights, 3878c.
Molecule, 464a, 3878a.
Mole shrew, 5364d.
Moleskin, 3877b.
Molière, 3878d.
Moline, Ill., 3879a.
Molino del Rey, Battle of, 3763d.
Mollusks, 3879c.
Mollwitz, Battle of, 5610b.
Molly Maguires, 2731d.
Moloch, 4644d.
Molokai Island, 3880b.
Molting, 730d, 1225b, 3880c.
Moltke, Helmuth Carl Bernhard, Count von, 3881a.
Moltke, Helmuth Joannes Ludwig von, 3881b.
Moluccas, 3881b.
Molybdenum, 1294d.
Momentum, 3881c.
Mommsen, Theodor, 3881d.
Monaco, 3882a.
Monadnock Mountain, 4155d.
Mona Island, 4774b.
*Mona Lisa*, 4452, 6087b.
Monarch butterfly, facing 1022, 4845d.
*Monarch of the Glen*, 4452.
Monarchy, 3882c.
Monasticism, 3882c.
Monck, Charles Stanley, 3884a.
Moncton, N. B., 3884c.
Monday, 3885a.
Monessen, Pa., 3885c.
Money, 3885b.
Money, Tables of, 1763a.
Money of the railroads, 4918b.
Money order, 3888c, 4791c.
Moneywort, 3547b.
Monge, Gaspard, 3840b.
Mongol dynasty, 1349a.
Mongolia, 3889a.
Mongolian race, 4909c.
Mongols, 3889c.
Mongoose, 3889d.
Monitor, 3890a.
*Monitor and Merrimac*, 2069b, 3890b.
Monk, 3890c.
Monk, George, 3890d, 4979b.
Monkey, 3891a.
Monkey wrench, 6362b.
Monmouth, Battle of, 3892a, 4988d.
Monmouth, James, 3892b.
Monmouth, Ill., 3892c.
Monocotyledons, 862b, 1611b, 5291b, 5546a.
Monomania, 3892d.
Monomaniac, 3893a.
Monongahela River, 3893a, 4566a.
Monoplane, 2238c.
Monopoly, 3893b.
Monorail car, Model for, 2650d.
Monorail, Suspended, 3893c.
Monotheism, 4746d.
Monotheistic religions, 4965c.
Monotype, 3894a.
Monroe, James, 3894b, 3901b.
Monroe, La., 3901a.
Monroe Doctrine, 3898d, 3901b.
Monrovia, Liberia, 3902b.
Monsalvat, Castle of, 4515c.
Monseigneur de Laval, 1120c.
Mons Graupius, 2557d.
Monsieur, 5820a.
Monsoon, 3902c, 6309b.
Monsoon current, 4334c.
Montagnais snowshoe, 5423c.
Montagu, John, 5189c.
Montaigne, Michel Eyquem de, 3902c.
Montana, 3903a.
Montana, University of, 3910c.
Mont Blanc, 3910d.
Montcalm de Saint-Veran, Louis Joseph, 3911a, 4897a.
Mont Cenis tunnel, 1249b.
Montclair, N. J., 3911c.
Monte Carlo, 3882b.
"Monte Carlo of Asia," 3167a.
Monte Cristo, 3911d.
*Monte Cristo, Count of*, 3911d.
Montenegrin Hills, 4888b.
Montenegro, 3912a.
Monterey, Battle of, 3914a.
Monterey, Mexico, 3913d.
Monte Rosa, 3914a.
Monte Rosa Falls, 6216a.
Montesquieu, Charles de Secondat, Baron de la Brede et de, 3914b.
Montessori, Maria, 3914b.
Montessori Method, 3915a.
Monteverde, Claude, 2691b, 4389b.
Montezuma, 3929d.
Montezuma's castle, 359d.
Montevideo, Uruguay, 3929b.
Montfort, Simon de, Earl of Leicaster, 3930b.
Montgolfier balloon, 559a.
Montgomery, Ala., 3930c.
Month, 3931b.
Monthon, 5367d.
Monticello, home of Jefferson, 3131c, 6099b.
Montijo, Eugenie-Marie de, 4067d.
Montmagny, Que., 3931d.
Montmorency Falls, 3932b.
Montmorency - Laval, Duke of, 3932b.
Montmorency River, 3932a.
Montpelier, Vt., 3932b.
Montpellier, France, 3932d.
Montreal, Que., 3609a, 3933a.
Monts, Pierre du Guast, Sieur de, 264a, 1266b, 3938b.
Montserrat, 3370b.
"Monumental City," 563b.
Monument to Daniel Boone, 3226a.
Mood, 3870b.
Moodie, Susanna, 1143a, 3938c.
Moody, Dwight Lyman, 3938c.
Moody, William Vaughn, 1309a, 3938d.
Moon, 3939a.
Moon, Eclipse of the, 1915b.
*Moon and Morning Stars* (game), 2376d.
Mooney, William, 5694c.
Moonflower, 3941d.
Moonlight schools, 3224b, 5247d.
*Moonlight Sonata*, 661a.
Moonstone, 2150b.
Moonstruck, 3535d.
Moore, Clement C., 4231a.
Moore, Sir John, 3942a.
Moore, Thomas, 3942b.
Moor-hen, 2366a.
*Moor of Venice, The*, 4425a.
Moors, 3942c, 5477a.
Moose, 3943b.
Moose Factory, Ont., 3109d, 3944d.
Moosehead Lake, 3943d.
Moose Jaw, Sask., 3944a.
Moose River, 3944c.
Moose yard, 3943c.
Moosilauke, Mount, 4155d.
Moosomin, Sask., 3944d.
Mora, Mount, 4172b.
Moraes, Prudente de, 906d.
Moraine, 3944d.
Morale, 379b.
Morality play, 1854c, 3945a.
Morals court, 3945b.

Moral training, 6288c.
Moran, Thomas, 4455b.
Morava River, 5311d.
Moravia, 3945c.
Moravian Brethren, 3946a.
Moraviantown, Battle of, 5779b.
Morbid fears of children, 1947c.
Mordants, 3946b.
Mordecai, 2081a.
Morden, Man., 3946b.
More, Sir Thomas, 3946c.
Morea, 4555b.
Morelia, Mex., 3946d.
Morel mushroom, 4014c.
Morelos, 3946d.
Moreno, Alfredo, 1922a.
Morgan, Sir Henry, 3947a.
Morgan, John Hunt, 3947a.
Morgan, John Pierpont, 3947b.
Morgan, John Tyler, 3948a.
Morgan, William, 284a.
Morganatic marriage, 3661a.
Morgan's Raiders, 3947a.
Morgantown, W. Va., 3948b.
Morgarten, Battle of, 5664a.
Morgiana, 200a.
Morin, Auguste Norbert, 3948c.
Moriscos, 3942d.
Morley, Henry, 3949a.
Morley, John, 3949b.
Mormaors, 5261b.
Mormons, 3949c.
Morning bride, 2207a.
Morning-glory, 3953a.
Morning-glory spring, 6380b.
"Morning Star of the Reformation," 6366b.
Morocco, 3953b.
Morocco (city), 3954b.
Morocco (leather), 3954c.
Morocco turban, 5904a.
Moroni, 3950b.
Moros, 4631b.
Morpheus, 3954d, 5440b.
Morphine, 3954d.
Morphine, Antidote for, 282a.
Morphology, 860d, 3955a.
Morrill Act, 102b, 3308d, 5247b, 5704c.
Morris, Arthur J., 3956c.
Morris, Clara, 3955b.
Morris, Gouverneur (1752-1816), 3955b.
Morris, Gouverneur (1876- ), 3955d.
Morris, Robert, 3955d.
Morris, William, 3956a.
Morris and Essex Canal, 1747d.
Morris Canal, 1147a, 4165d.
Morrison, Mount, 3118b.
Morrison, Robert, 3843d.
Morris Plan banks, 3956c.
Morristown, N. J., 3956d.
Mors, 5440a.
Morse, Samuel Finley Breese, 3957a.
Morse telegraph code, 5734d.
Mortality, Law of, 3957d.
Mortality, Table of, 2114a.
Mortar (artillery), 403d.
Mortar (utensil), 3958b.
*Morte d'Arthur*, 711a, 3614a.
Mortgage, 3958c.
Mortgage bonds, 807a.
Mortgage deed, 3958c.
Mortgages as investments, 3959a.
Morton, Julius Sterling, 3959b.
Morton, Levi Parsons, 3959d.
Morton, Oliver Perry, 3960a.
Morton, Thomas, 4903a.
Morton, William James, 3960a.
Morton, William Thomas Green, 2082c, 3960b.
Mosaic, 3960c.
Mosaic tiles, 5812d.
Mosby, John Singleton, 3960d.
Moscow, Kremlin, 3278d.
Moscow, Russia, 3961a.
Moselle River, 3962a.
Moses, 3962b.
*Moses* (statue), 3963b.
Mosque, 3964d.
Mosque of Omar, 3142d.
Mosque of Saint Sophia, 325a, 5167c.
Mosque of Shah-Zindeh, 5181d.
Mosquito, 3965a.
Mosquito Coast, 3969b.
Mosquito hawk, 3968d.
Mosquito protectorate, 4668d.
Mossbunker, 3733a.
Mosses, 3969d.
Mosslike plants, 967d.
Mossy-cup oak, 4324a.
Mosul, Mesopotamia, 4037a, 4239b.
Moth, 3970b.
Moth and butterfly compared, 1021b, 3970c.
Mother, Queen, 4898d.
Mother Carey's chicken, 4611a.
Mother Goose, 3971a.
*Mother Goose Rhymes*, 3316b.
Mother-of-pearl, 3972a, 4543b.
"Mother of Presidents," 6091b.
"Mother of States and Statesmen," 6091b.
"Mother of Thanksgiving," 5780d.
Mother of vinegar, 6087d.
Mothers, National Congress of, 4074a.
Mothers, Value of kindergarten training for, 3249b.
Mother Shipton, 3972a.
Mothers' pensions, 3972b.
"Mother Volga," 5114b.
Motion, Laws of, 1893a.
Motions (parliamentary law), 4510a.
Motivation of teaching, 5724d.
Motley, John Lothrop, 3972d.
Motmot, 3973b.
Motor, Electric, 1994d.
Motor boat, 3973c.
Motorcycle, 3974c.
Motor nerves, 4120b.
Motors, Types of electric, 1996b.
Mott, Lucretia Coffin, 3975b.
Moukden, Manchuria, 3995d.
Moulton, Richard G. (quoted), 5436c.
Moultrie, William, 3975d.
Mound bird, 3976b.
Mound Builders, 3976d.
Mound circle, 3976a.
Mound of the Lion, 6216d.
Moundsville, W. Va., 3977d.
Mount, Sermon on the, 3146a.
Mountain, 3978a.
Mountain ash, 3979a.
Mountain climbing in Switzerland, 5663a.
Mountain Lapps, 3331d.
Mountain laurel, 3200b.
Mountain leather, 2837c.
Mountain lion, 4868d.
Mountain parrot, 4513d.
Mountain quail, 4883c.
"Mountain Republic," 800d.
Mountain shoe, 5423c.
Mountain sumac, 5622a.
Mountain time, 5524b.
Mountain zones, 6416a.
Mount Allison University, 3979a.
Mount Carmel, Pa., 3979b.
Mount Desert Island, 3603b, 3979c.
Mount Holyoke College, 3979c.
Mount McKinley National Park, 4505a.
Mount of Olives, 4371b.
Mount of the Holy Cross, 1493c.
Mount Olivet, 4371b.
Mount Pinnacle, 5456d.
Mount Rainier National Park, 4505a.
Mounts (palmistry), 4464d.
Mount Stephen, George Stephen, First Baron, 3979d.
Mount Vernon, home of Washington, 3980d, 6202b.
Mount Vernon, Ill., 3981d.
Mount Vernon, N. Y., 3982a.
Mount Vernon, Ohio, 3982b.
Mount Washington Railroad, 4158d.
Mount Wilson Solar Observatory, 5743d.
Mourning, 3982c.
Mourning cloak butterfly, facing 1022.
Mourning dove, 1846c, 4671a.
Mouse, 3982d.
Mouse lemur, 3379b.
Mouse River, 4270a.
*Mouse Tower, Legend of the*, 721d.
Moustache, 638a.
Mouth, 3983b.
Mouth organ, 2691a.
Movable bridges, 923b.
Movable joints, 3167b.
Movable pulley, 4867c.
Movements of ocean currents, 4333d.
Movements of the planets, 4696a.
Moving picture, 3984a.
Moving picture films, Development of, 3990d.
Moving picture films, Distribution of, 3991b.
Moving picture industry, 3987a.
Mowat, Sir Oliver, 3992c.
Mowing machine, 3993a.
Mozambique, 4785b.
Mozambique Channel, 3993a.
Mozambique current, 4334b.
Mozart, Johann Chrysostomus Wolfgang Amadeus, 3993b.
Mpret, 149a.
Mtosotis, 2267b.
Mucilage, 3994c.
Mucous membranes, 3727a.
Mucus, 3994c.
Mud eel, 3994d.
Mud geyser, 6391c.
Mud hen, 1570d, 2366a.
Mud lamprey, 3305b.
Mud puppy, 3994d.
Mud sunfish, 5629c.
Mud turtle, 395a, 5762c.
Muezzin, 3814b.
Muggins, 1840b.
Mugwumps, 1419b.
Muhlberg, Battle of, 5235a.
Muhlenberg, Frederick A., 4624b.
Muir, John, 3995a.
Muir glacier, 3995c.
Mukden, Battle of, 5127b.
Mukden, Manchuria, 3995d.
Muksun, 6273c.
Mulatto, 3996a.
Mulberry, 3996a.
Mule, 3996d.
Mule deer, 1739a, 3997b.
Mule jenny, 5499d.
Mule tractor, 5854b.
Mulhacén, Mount, 5473b.
Mullein, or Mullen, 3997b.
Müller, Friedrich Max, 3997c.
Müller, Lauro, 907a.
Mullet, 3998a.
Mullins, Priscilla, 171d, 1616a.
Mulock, Dinah Maria, 1622c.
Mulock, Sir William, 3998a.
Multan, India, 4872c.
Multigraph, 3998b.
Multiple, Least common, 3358b.
Multiple fracture, 2293a.
Multiple neuritis, 4131b.
Multiple switchboard, 5739a.
Multiplicand, 3999a.
Multiplication, 3998c.
Multiplication in algebra, 191a.
Multiplication of decimals, 1733b.
Multiplication of denominate numbers, 1768a.
Multiplication of fractions, 2287c.
Multiplier, 3999a.
Multiplying camera, 1081a.
Multi-polar motor, 1996a.
Mummius, Lucius, 1580c.
Mummy, 2019d, 4001d.
Mummy corn, 1585d.
Mumps, 4002b.

Mumtaz-i-Mahal, 5688b.
München, Germany, 4003b.
Münchhausen, Hieronymus Karl Friedrick, Baron, 4002c.
Muncie, Ind., 4002a.
Mundelein, Most Rt. Rev. George W., 4003a.
Mungoose, 3889d.
Munich, Germany, 4003b.
Municipal building, N. Y., 4209a.
Municipal government, 4004a.
Municipal home rule, 2823d.
Municipal ownership, 4004d.
Municipal pier, Chicago, 1314a.
Municipal quarantine, 4884d.
Municipal single tax, 5391c.
Munkácsy, Mihály, 4006a.
Munroe, Kirk, 4006a.
Munsee Indians, 4006b.
Munson, James E., 5358d.
Münster, Germany, 4006c.
Münsterberg, Hugo, 4006c.
Muntz metal, 897c.
Muradabad, India, 4007a.
Mural circle, 4007a.
Murat, Charles Louis, 5691c.
Murat, Joachim, 4007b.
Muratore, Lucien, 4007b.
Muratore, Madame Lucien, 1240b.
Murchison Rapids, 5357b.
Murcia, Spain, 4007c.
Murder, 4007d.
Murdock, William, 2401b.
Murfree, Mary Noailles, 4008a.
Murfreesboro, Battle of, 4008b.
Muriatic acid, 2888d.
Murillo, Bartelome Esteban, 4008c.
Murphy, Archibald De Bow, 4259d.
Murphy, Charles F., 5695b.
Murray, George Henry, 4009b.
Murray, James, 4009c.
Murray, John, 6000a.
Murray, Sir John, 1143d, 4009d.
Murray, Walter Charles, 4010a.
Murray River, 4010b.
Murrumbidgee River, 4010c.
Muscat, Arabia, 4010c, 4375c.
Muscatel raisins, 4924d.
Muscatine, Ia., 4010d.
Muscle reading, 3815c.
Muscles, 4011a.
Muscle sense, 4012a.
Muscle Shoals and Elk River Shoals Canal, 1147a.
Muscovite, 3778b.
Muscular control, 1323d.
Muscular development, 4011d.
Muscular rheumatism, 4993b.
Muscular tissue, 5818b.
Muses, 4012b.
Museum, 4012c.
Museums, Educational, 1950a.
Mushroom, 859d, 4013a.
Mushroom family, 4014a.
Mushrump, 4013b.
Music, 4017a.
Musical accent, 4024c.
Musical comedy, 4390b.
Musical education (Montessori Method), 3924b.
Musical instruments, 4032d, 4399.
Musical terms, 4021b.
Music drama, 4389d.
Musk, 4033a, 4584c.
Muskat, Arabia, 4010c.
Musk deer, 4033a.
Muskegon, Mich., 4033b.
Muskellunge, 4033c.
Musket, 4034a.
Muskhogean Indians, 4034b.
Muskingum River, 4348c.
Muskmelon, 4034b.
Muskogee, Okla., 4035b.
Muskoka district, 4035d.
Muskoka Lakes, 4035d.
Musk ox, 4036a.
Muskrat, 4036c.
Muslin, 4037a.
Mussel, 4037a.
Mussel mud, 4819b.
Mussel shells, 4543d.
Musset, Alfred de, 4037b.
Mustard, 4037c.
Mut, 236b.
Mute swan, 5644a.
Mutina, 3870d.
Mutsuhito, 4038a, 6397d.
Mutton, 4038c.
Mutton type sheep, 5341d.
Mutual banks, 5225d.
Mutual building companies, 987d.
Mutual insurance companies, 3005a.
Muybridge, Eadweard, 3989b.
Mweru Lake, 77d.
Mycelium, 4013d, 4865c.
Mycenae, Greece, 4038d.
Mycerinus, 4879a.
*My Faith Looks up to Thee*, 2896a.
*My Lord's Toilet* (game), 2375d.
Myocarditis, 2747b.
Myopia, 4039a.
Myriapoda, 4039b.
Myron, 5273d.
Myrrh, 4039c.
Myrtle, 4039c.
Myrtle warbler, 6136d.
Mysia, 4653a.
Mysore, India (city), 4040a.
Mysore (state), 804a, 3588b.
Mysteries, 4040b.
*Mystery of Edwin Drood*, 1790c.
Mystery play, 1854c, 4040c.
Mysticism, 4040d.
Mystic shrine, 3681a.
*My Symphony*, 1630d.
Myth, 3371b.
Mythology, 4041a.

# N

N, 4055a.
Nabius, Palestine, 5181c.
Nabonidus, 1683c.
Nabopolassar, 4055b.
Naboth, 3151d.
Nachvak Mountains, 3345b.
Nacre, 3972a.
Nadir, 4055b, 6410c.
Nagana, 5895b.
Nagasaki, Japan, 4055d.
Nagoya, Japan, 4056a.
Nahr-el-Kebir River, 3364a.
Nahum, 4056a.
Naiads, 4321c.
Nails (metal), 4056c.
Nails (physiology), 4056b.
Nak-dong River, 1364b.
Names, Personal, 4057a.
Naming of stars, 5528b.
Namur, Belgium, 4057c.
Nanaimo, B. C., 4057d.
Nanak Shah, 5380a.
Nana Sahib, 4058b.
Nandu, 4991d.
Nancy, France, 4058c.
Nanking, China, 4058d.
Nanking, Treaty of, 4239d.
Nanna, 4047c.
Nansen, Fridtjof, 4059a.
Nantes, Edict of, 4060a, 4959d.
Nantes, France, 4059c.
Naomi, 5129b.
Nanticoke, Pa., 4060b.
Nantucket Island, 4060b.
Napanee, Ont., 4060c.
Naphtha, 4060c.
Naphtha soaps, 5424c.
Napier, John, 4060d.
Naples, Bay of, 4062a.
Naples, Italy, 4061a.
Naples, University of, 4061d.
Napoleon (coin), 1468c.
Napoleon I, 1975b, 2336c, 3375c, 4062b, 6216d.
Napoleon II, 4963c.
Napoleon III, 4067b.
*Napoleon at Fontainebleau*, 4452.
Napoleonic code, 1459d.
Napoleon's willow, 6296d.
Narbada River, 4118a.
Narcissus (flower), 4068c.
Narcissus (mythology), 4068a.
Narcissus bulb, 989d.
Narcotic, 4068d.
Nard, 5498d.
Nares, George Strong, 4727c.
Narodno Sobranye, 991a.
Narragansett Bay, 4069b, 4997a.
Narragansett Indians, 4069b.
Narragansett Pier, 4997b.
Narrow-gauge railroads, 4918d.
Narrows, The, 4206a.
Narvaez, Panfilo de, 4069c.
Narwhal, 4069d.
Nasal bone, 2738d.
Nasal passages, 4290b.
Nasby, Petroleum Vesuvius, 3474c.
Naseberry, 1320a.
Naseby, Battle of, 4069d.
Nashua, N. H., 4070a.
Nashville, Tenn., 4070b.
Nasmyth, James, 4071b, 5541a.
Nasr-ed-Din, 4595d.
Nast, Thomas, 4071c.
Nasturtium, 4071d.
Natal, 4072a.
Natchez, Miss., 4072c.
Natchez, Miss., Governor's house at, 3850a.
*Nathan's Parable*, 4483c.
Natick, Mass., 4073a.
"Natick cobbler", 6299b.
National Academy of Design, 4073b.
National Academy of Sciences, 4073c.
National Association of Amateur Oarsmen, 5093c.
National banks, 579d.
National Baseball League, 605b.
National Board of Censorship, 3992b.
National Cash Register Company, 5894b.
National Civic Federation, 4073d.
National coats of arms, 2777a.
National Congress of Mothers and Parent-Teacher Associations, 4074a, 4493b.
National Convention (France), 2335d.
National Covenant, 1616d.
National debt, 4075d.
National Education Association, 1952c.
National farm loan associations, 5109b.
National flowers, 2227d.
National Geographic Society, 2421d.
National Grange of Patrons of Industry, 2563b.
National Guard, 3801b.
National hymns, 2893c.
Nationalism, 3021c.
National libraries, 3404d.
National Museum of the United States, 4076d.
National Parks Highway, 5032d.
National People's Charter, 1282d.
Nationalrat, 5662b.
National Road, 1669c.
National single tax, 5392a.
National taxation, 5714a.
National Transcontinental Railway, 4916b.
Nations, Battle of the, 3375c.
Nations, War of the, 6151a.
Native platinum, 4701d.
Native rabbit, 571c.
Native sloth, 3273c.
Nat Turner Insurrection, 4077b.
Natural (in music), 4028c.
Natural astrology, 438c.
Natural bridge, 4077c.
Natural Bridge, Ky., 3227d.
Natural education, 1929b.
Natural gas, 4078b.

Natural history in moving pictures, 3985a.
*Natural History* of Pliny, 4707d.
*Natural History of Selborne*, 6271c.
Natural ice, 2902d.
Naturalization, 4079a.
Naturalized citizens, Rights of, 4079d.
Natural key (music), 3234a, 4026c.
Natural monopolies, 3893c.
Natural order of the sentence, 5304b.
Natural philosophy, 4657b.
Natural pruning, 4852d.
Natural scale, 4030b.
Natural selection, 1705d, 4080b.
Natural theology, 4081c.
Nature study, 4081b.
Nature sympathy, 4083b.
Nature worship, 4089a.
Naucratis, Egypt, 4611c.
Naugatuck, Conn., 4089b.
Nausea, 4089b.
Nausicaa, 4343d.
*Nautical Almanac*, 209a, 4094b.
Nautical bell, 677b.
Nautical mile, 3796c.
Nautilus, 4089c.
Nauvoo, Ill., 3951d.
Navaho blanket, color plate, facing 2962, 4090d.
Navaho Indians, 4090b.
Naval Academy, United States, 4091b.
Naval ammunition, 237c.
Naval apprentice, 300d.
Naval armament, 6182b.
Naval arsenals, 389b.
Naval attaché, 466b.
Naval division, 5678a.
Naval guns, 4097c.
Naval militia, 4092d.
Naval Observatory, United States, 1810d, 4092b.
Naval reserve, 4092c.
Naval schools of instruction, 4093a.
Naval tactics, 5678a.
Naval torpedo school, United States, 4093b.
Naval uniforms, 5940b.
Naval War College, United States, 4093a.
Navarino, Battle, 2607c, 3598b.
Navarre, 4093c.
Navarre, Henry of, 2772b.
Nave, 4093d.
Navel oranges, 4393d.
Navies of the world, Comparative strength of, 4098b.
Navigation, 4094a.
Navigation, Bureau of, 1512c.
Navigation Acts, 4094c.
Navigation laws, 4094d.
Navigator Islands, 5182a.
Navy, 4095a, 4096b.
Navy, Department of the, 4099a.
Navy, Rank in, 4928d.
Navy bean, 634a.
Navy of the United States, 4096b.
Navy yards of the United States, 389b, 1825c, 4098c.
"Nazarene painters," 1591a, 4455a.
Nazareth, Palestine, 4099c.
Nazarite, 4099c.
Nazarites (Free Methodists), 2324a.
Nazimova, Alla, 4099d.
Neagh, Lake, 3046a.
Neale, Thomas, 4790d.
Neap tide, 5808c.
*Nearer Home*, 1211c.
*Nearer My God to Thee*, 2895d.
Near sight, 4039a.
Nebo, Mount, 4100a.
Nebraska, 4100b.
Nebraska, University of, 4107c.
Nebuchadnezzar, 2683d, 4107d.
Nebula, 441b, 4108a.
Nebular hypothesis, 2437a, 4108b.
Necessity of play, 4705b.
Nechako River, 4821b.
Necho, 4108c.
Necker, Jacques, 4108d.
Necklace poplar, 1611a.
Neck sweetbread, 5652c.
Necromancy, 4109a.
Necropolis, 4109a.
Nectar, 4109c.
Nectarine, 4109c, 4538d.
Nederlanders, 4122b.
Needle, 4109c.
Needle-point lace, 3290a.
"Needless Battle," The, 6143a.
Needle telegraph, 5736b.
Needs of the body, 4315d.
Neepawa, Man., 4110a.
Nefretere, Queen, 4927d.
Negative (photography), 4650a.
Negative charge, 1984d.
Negative eugenics, 2090d.
Negative of moving picture film, 3991a.
Negative quantity, 187b, 4110b.
Negaunee, Mich., 4110b.
Negligence, 4110c.
Negotiable paper, 4111a, 4292b.
Negrillos, 4876a.
Negri Sembilan, 2148d.
Negritos, 4111d, 4631a, 4876a.
Negro, 4111d.
Negro, Education of the, 4112a.
Negro race, 4909c.
Negus, 4112d.
Negus, Francis, 4112d.
Nehemiah, 4112d.
Neighborhood centers, 1517a.
Neleus, 4121c.
Nelson, B. C., 4113a.
Nelson, Horatio, 4113b.
Nelson, Wolfred, 4114d.
Nelson River, 4115a.
Nelumbo, 4115c.
Nemean games, 4115d.
Nemesis, 4115d.
Neodymium, 1294d.
Neolithic period, 5559b.
Neon, 1294d.
Neo-Platonism, 4642a.
Neoptolemus, 4815c.
Nepal, India, 4116a.
Nephi, 3951b.
Nephites, 3951b.
Nephritis, 4116c.
Nepigon, Lake, 4240b.
*Ne plus ultra*, 2781b, 4643d.
Nepos, Cornelius, 4116d.
Nepos, Emperor, 4343a.
Nepotism, 4116d.
Neptune (astronomy), 4117c, 4695c.
Neptune (mythology), 4117a.
Nerbudda River, 4118a.
Nereids, 4118a.
Nereus, 4118b.
Nernst lamp, 1991a.
Nero, Aqueduct of, 307a.
Nero, Lucius Domitius, 4118b.
Nerva, Marcus Cocceius, 4119a.
Nerve-blocking, 1769c.
Nerve poisons, 4721d.
Nerves, 4119a.
Nerve tissue, Structure of, 4119c.
Nerve tonics, 5834c.
Nervous disorders of children, 1947a.
Nervous habits, 2653b.
Nervous system, 4119b.
Nervous tissue, 5818b.
Nessus, 2780d.
Nest, 738b.
*Nest of Nobles, A*, 5905c.
Nest of the ant, 271b.
Nestor 4121c.
Net, 4121d.
Netherlands, The, 4122a.
Netherlands, The, Flag of, 2199a.
Nethersole, Olga, 4129c.
Netted veining in leaves, 3361d, 6046d.
Nettle, 4129d.
Nettle beer, 4129d.
Nettle rash, 2803b, 6005d.
Nettle tree, 4130a.
Neuchâtel, Lake of, 4130b.
Neuchâtel (city), Switzerland, 4130b.
Neufmoustier, Monastery of, 4609b.
Neuhof, Switzerland, 4605a.
Neuralgia, 4130c.
Neurasthenia, 3414d, 4130d.
Neuritis, 4131a.
Neurone, 4119c.
Neuroptera, 3001a, 4131b.
Neurosis, 4131c.
Neurotic, 4131d.
Neuse River, 4467c.
Neuter gender, 2415a.
Neuters (bees), 649a.
Neutrality, 4131d.
Neutral states during war, 3021a.
Neva River, 4132c.
Nevada, 4132b.
Nevada, University of, 4138b.
Neversink Mountain, 4943d.
Nevin, Ethelbert, 4138c.
Nevis Island, 5147d.
Nevsky Prospekt, 4612a.
New Albany, Ind., 4138d.
New Amsterdam, 4214b.
Newark, N. J., 4139a.
Newark, Ohio, 4140b.
Newars, 4116b.
New Babylonian Empire, 533d.
New Bahama Channel, 2220b.
New Bedford, Mass., 4140c.
Newbern, N. C., 4141a.
New Brighton, Pa., 4141c.
New Britain, Conn., 4141c.
New Brunswick, 946b, 4142a.
New Brunswick, N. J., 4147b.
New Brunswick, University of, 4147d.
Newburgh, N. Y., 4148a.
Newburyport, Mass., 4148d.
New Caledonia Island, 2169d, 4149a.
Newcastle, Australia, 4149c.
New Castle, Ind., 4149d.
Newcastle, N. B., 4149b.
Newcastle, Pa., 4150a.
Newcastle-upon-Tyne, England, 4150b.
New-chang, China, 3995d.
Newcomb, Josephine L., 5898c.
Newcomb, Simon, 4150d.
Newcomen engine, 5540a.
New Connecticut, 6067c.
New Delft, 1749c.
New England Confederation, 4151c.
New England Mountains, 4183b.
New England Transcendentalism, 5858d.
Newfoundland, 4151b.
Newfoundland dog, 4153a.
New France, 1091b.
New Friesland Island, 5503b.
New Glasgow, N. S., 4153c.
New Granada, 1475b.
New Guinea Island, 4154a.
New Hampshire, 4154b.
New Hampshire grants, 204a.
New Harmony, Ind., 4433b.
New Haven, Conn., 4160b.
New Hebrides Islands, 2169d, 4161b.
New Holland, 491b.
New Jersey, 4161b.
New Jersey Coastal Inland Waterway Canal, 1147a.
"New Jersey plan," 5980d.
New Jerusalem Church, 5652b.
New Liskeard, Ont., 4169a.
New London, Conn., 4169b.
Newman, John Henry, 4170a.
New Manitoba, 3626c.
Newmarket, Ont., 4170d.
New Mecklenburg Island, 4170d.
New Merv, 3748d.
New Mexico, 3764b, 4171a.

New Mexico, University of 4177a.
New Ontario, 4379b.
New Orleans, Battle of, 3094c, 4177c.
New Orleans, La., 4177b.
New Orleans Exposition, 1421c, 3520d.
New Philadelphia, Ohio, 4180c.
Newport, Christopher, 3110c.
Newport, Ky., 4180d.
Newport, R. I., 4093a, 4181a.
Newport News, Va., 4181c, 6095d.
New Providence Island, 543b.
New Red Sandstone, 4182a.
New River, 2596b, 6253d.
New Rochelle, N. Y., 4182b.
News, How obtained, 4185a.
New Scotland, 4296a.
New Siberia Island, 4182d.
New South Wales, 4182d.
New Spain, 3771b.
Newspaper, 4184b.
Newspaper presses, 4826b.
Newstead Abbey, 3c.
Newt, 4188a.
*New Testament,* 705d.
Newton, Sir Isaac, 1482b, 2578d, 3422b, 4188b.
Newton, Mass., 4189a.
New Westminster, B. C., 4189c.
New Year, 4190b.
New York (city), 2764b, 2860b, 2861b, 4204b.
New York (state), 4193a.
New York, College of the City of, 4216a.
New York, University of the State of, 4216b.
New York Fire Zouaves, 6419c.
New York, New Haven & Hartford Railroad, 2654d.
New York Public Library, 3403b.
New York State Barge Canal, 1148a, 4216b.
New York University, 4217d.
New Zealand, 4218a.
New Zealand flax, 2205b.
Ney, Michel, 4222c.
Neyra, Mendana de, 3658d.
Nez Percés Indians, 4222d.
Niagara, Ont., 4223a.
Niagara escarpment, 1096c, 4380a.
Niagara Falls, 6215b.
Niagara Falls, N. Y., 4223c.
Niagara Falls, Ont., 4223b.
Niagara Falls and River, 4224a.
Niagara Falls Park, 4225a.
"Niagara of Brazil," 5203a.
*Nibelungenlied,* 2465a, 4226b.
Nibs, 1456b.
Nicaea, Councils of, 4229b.
Nicaragua, 4226d.
Nicaragua, Lake, 4228a.
Nicaragua Canal, 4228b.
Nicaras, 4227a.
Nice, Councils of, 4229b.
Nice, France, 4229a.
Nicene Creed, 1630b, 4229c.
Nicholas, Grand Duke, 6157a.
Nicholas, Saint, 4230d.
Nicholas I (Nicholas Pavlovitch), 4229c.
Nicholas I (Pope), 4648b.
Nicholas II, 4230a, 5055c, 5826d.
*Nicholas Nickleby,* 1789d, 4231b.
Nicholson, Francis, 4300d.
Nicholson, Meredith, 4231b.
Nicholson's hydrometer, 2889d.
Nicias, 4231c.
Nicias, Peace of, 4231c.
Nickel, 4231d, 5612c.
Nickel silver, 2466b.
Nickel steel, 5542d.
Nickel telephone, 5408c.
Nicobar Islands, 4232a.
Nicolay, John G., 2727d.
Nicolet, Que., 4232a.
Nicolo Polo, 4744b.
Nicot, Jean, 5826b.
*Nicotiana tobacum,* 5823c.
Nicotine, 202d, 4232b.
Nicotine, Antidote for, 282a.
Niello, 4232d.
Nielsen, Alice, 4232d.
Nietzsche, Friedrich Wilhelm, 4233a.
Nieuw Amsterdam, 4214a.
Nifiheim, 4233c.
Niger River, 4233c.
Nigeria, 84b, 4234a.
Nigger-toe, 908a.
Night-blooming cereus, 1039c.
Nighthawk, 4234b.
Night heron, 4234d.
Nightingale, 4234d.
Nightingale, Florence, 4235b.
Nightjar, 2518b.
Nightmare, 4236a.
Night schools, 5240c.
Nightshade, 4236b.
Nightshade family, 856a, 857d.
Night terrors, 1947d, 4236a.
*Night Watch, The,* 4452, facing 4968.
Nihilists and Nihilism, 4236c.
Niihau Island, 2717c.
Nijni Novgorod, Russia, 4242b.
Nike Apteros, Temple of, 4237a.
Nike of Samothrace, 6314a.
Nikolayevsk, Siberia, 4358c.
"Nile of America," 1494c.
Nile River, 4237c.
Nilgiri Hills, 4925d.
Nilsson, Christine, 4238b.
Nimbus, 4238c.
Nimbus cloud, 1438d.
Nimes, France, 4239a.
Nimrod, 4239b.
Nimrud, Mesopotamia, 432d.
*Nina,* The, 1502a.
"Nine days' queen," 2624d.
Nine-hole golf course, 2530b.
Nineteenth century dress, 1859c.
Ninety-five theses, 3539c.
Nineveh, 4239b.
Ning-po, China, 4239d.
Ninus, 5299a.
Niobe, 4240a.
Niobrara River, 4102b.
Nipigon, Lake, 4240b.
Nipigon Forest Reserve, 4240c, 4382c.
Nipissing, Lake, 4240c.
Niriz, Lake, 4595a.
Nirvana, 977b.
Nisan, 4240d.
Nishapur, Persia, 4593d.
Nisqually glacier, 4924b.
Nisqually River, 6187d.
Niter, 5178c.
Niton, 1294d.
Nitrate of silver, 3536a.
Nitrate of soda, 1332b.
Nitrates, 4241a.
Nitric acid, 4241a.
Nitrogen, 4241b.
Nitrogen lamp, 1990d.
Nitroglycerine, 4241d.
Nitrous oxide, 4242a.
Nivara, 5005d.
Nix, 4242a.
Nizam's dominions, 2883d.
Nizhni Novgorod, Russia, 4242b.
Nizza, France, 4229a.
Noah, 4242c, 4934d.
Nobel, Alfred, 4242d, 5417b.
Nobel prizes, 4242d.
Noble gases, 73d.
Noble metal, 73d, 2524a.
Noble opal, 4388c.
Nobility, 4243d.
Node, 4244b.
Nodules, 2209b.
Nogat River, 6102c.
Nogi, Kiteu, 4244c.
Nolan, Philip, 2664d.
Nomad life, 313b, 4244d.
Nomads, Tents of, 5758d.
"No Man's Land," 4365b.
*Nom de plume,* 200a.
Nome, Alaska, 4245a.
Nominal partners, 4519a.
Nominating election, 4816c.
Nominative case, 1213b.
Nonautomatic valve, 6025d.
Non-commissioned officer, 379b.
Nonconductor, 1674d, 1984c.
Nonconformists, 4245c.
Non-drying oils, 4357c.
Nones, 3931c, 4245d.
Non-Importation Act, 6140c.
Non-Intercourse Act, 4245d, 6141a.
Nonmetallic minerals, 3816c.
Nonnezoshi Natural Bridge, 4077d, 6013c.
Nonpareil type, 5930d.
Nonsaccarine sorghums, 5442d.
Nootka Sound, 6032d.
Nordau, Max Simon, 4246a.
Nordenskiöld, Nils Adolph Eric, 4246a, 4727c.
Nordica, Lillian, 4246b.
Nordkyn, Cape, 4282b.
Norfolk, Va., 4246c.
Norfolk Island, 4247b.
Norfolk savoy spinach, 5499a.
Norfolk spaniel, 5479d.
Normal key, 3234a.
Normal school, 5245b.
Normal weight, 4330a.
Norman architecture, 4247c.
Norman Conquest, 6290a.
Normandy, 4247d.
Normans, 4248a.
Norman's Woe, 2512b.
Norns, 4248c.
Norris, Tobias Crawford, 4248c.
Norristown, Pa., 4248d.
Norrköping, Sweden, 5648c.
Norrland, 5646a.
Norse gods, 4044d.
Norse lullaby, 2165a.
Norsemen, 4248a, 4275c.
North, Christopher, 6299d.
North, Frederick, 4249a.
North Adams, Mass., 4249c.
North America, 4249b.
North American Conservation Conference, 1553a.
North American snail, 3879d.
Northampton, Eng., 4257c.
Northampton, Mass., 4257d.
North Attleboro, Mass., 4258b.
North Battleford, Sask., 4258b.
North Bay, Ont., 4258c.
North Braddock, Pa., 4258d.
Northbridge, Mass., 4259a.
North Cambridge, Mass., 1076d.
North Cape, 4259c.
North Cape Plateau, 4296d.
North Carolina, 4259a.
North Carolina, University of, 4267b.
North Carolina College of Agriculture and Mechanic Arts, 4267c.
North China peach, 4538c.
Northcliffe, Alfred Charles William Harmsworth, Lord, 4267d.
North Dakota, 4268b.
North Dakota, University of, 4274c.
Northeast boundary, 3607b.
North East Land, 5503b.
Northeast trade winds, 6309b.
North equatorial current, 4334d.
Norther, 4274d.
Northern lights, 480b.
Northernmost structure in Norway, 4285b.
Northern Pacific Railroad, 4921a.
Northern Rhodesia, 5001d.
Northern Securities Company, 5074a, 5894b.
Northern shrike, 5364d.
Northern staghound, 5521a.
Northern Territory, 4275a.
North frigid zone, 6415d.
North Holland Canal, 239d.
Northmen, 4248a, 4275c.
North Mountains, 4296d.
North New River Canal, 1147a.
North Platte River, 4704a.

North Polar Exploration, 4725b.
North Pole, 1565b, 4543d; map, 330a.
North Pole, Discovery of the, 4725b.
Northrop, Cyrus, 3835d, 4277a.
North Saskatchewan River, 5217d.
North Sea, 4277a.
North Star, 4277c.
North Star State, 3827a.
North Sydney, N. S., 4277d.
North temperate zone, 6415c.
North Tonawanda, N. Y., 4278a.
Northumberland Strait, 4142b, 4818b.
North Vancouver, B. C., 4278a.
Northwestern University, 4278b.
Northwest Passage, 4278d, 4727c.
North West Territories, 4280b.
Northwest Territory, 4281a.
North Yakima, Wash., 4281b.
Norton, Charles Eliot, 4281d.
Norton Sound, 4245b.
Norumbege, 6088b.
Norwalk, Conn., 4282a.
Norway, 4282b.
Norway itch, 3087a.
Norway maple, 3643b.
Norway pine, 4678b.
Norway spruce, 5512b.
Norwegian mile, 3796c.
Norwegian national hymn, 2894a.
Norwegian skate, 5397d.
Norwich, Conn., 4289c.
Norwich, England, 4289b.
Norwood, Ohio, 4290a.
Nose, 4290b.
"No-see-um," 2517a.
Nostrils, 4290b.
Notary public, 4290d.
Notation, 4291a.
Note, 4292a.
Notes, Musical, 4022c.
Notre Dame, Cathedral of (Montreal), 1228b.
Notre Dame, Cathedral of (Paris), 1229b, 4292d.
Notre Dame, University of, 4293a.
Notre Dame Mountains, 4888b.
Nottingham, Eng., 4293b.
Nottingham lace, 4293c.
Noun, 4293d.
Noun-verbal, 4518a.
Nova Scotia, 946b, 4296a.
Novaya Zemlya, 4301d.
Nova Zembla Islands, 4301c.
Novel, 4302a.
November, 4305b.
Noves, Laura de, 4610b.
Nox, 4042d.
Noyes, Alfred, 4308b.
Noyes, John Humphrey, 4376c.
N-Rays, 4308c.
Nubia, 4308c.
Nucleolus, 1247a.
Nucleus, 1247a.
Nueces River, 4978a.
Nuestra Senora de la Asuncion, 449b.
Nueva Gerona, West Indies, 3072c.
Nuisance, 4308d.
Nullification, 1055b, 3096a, 4309a.
Numa Pompilius, 4309c.
Number (grammar), 4294d, 4309d, 6057b.
Numbering machine, 4310d.
*Numbers, Book of*, 4310d.
Numbers, Divisibility of, 1815c.
Number work (Montessori Method), 3924a.
Numeration, 4291a.
Numidia, 196c, 477d, 4311a.
Numismatics, 4311b.
Numitor, 5066b.
Nummulite, 4312a.
Nun, 4312b.
Nun (Phoenician letter), 4055a.
*Nunc Dimittis*, 4312b.
Nuncio, 4312c.
Nuns of Saint Ursula, 6005d.
Nuremberg, Germany, 4312c.
"Nuremberg eggs," 4312d.
*Nuremberg Pharmacopoeia*, 4618a.
Nurse, 4313a.
Nurse, Training of the, 2845d.
Nursery, 4313b.
Nut, 4313c.
Nutation, 4314a.
Nut buoy, 1000c.
Nutcracker, 4314a.
Nuthatch, 4314b.
Nutmeg, 4314d.
Nutmeg melon, 4034c.
Nutmeg State, 1545b.
Nut pine, 4677d.
Nut planer, 4696d.
Nutrition, 4315b.
Nux vomica, 282a, 4320b.
Nyassa, Lake, 4320b.
Nyassaland protectorate, 81d.
Nye, Edgar Wilson, 4321a.
Nymphs, 4321b.
Nyx, 2068c.

# O

O, 4322a.
Oahu Island, 4322b.
Oak, 4322b.
Oakland, Cal., 4324c.
Oakum, 2768a, 4325c.
*O* and *Oh*, When to use, 3016d.
Oarses, 6376d.
Oases of Sahara, 5142d.
Oasis, 4325c.
Oasis in the desert, facing 1774.
Oath, 4325d.
Oath of office, 4326b.
Oats, 4326c.
Oat smut, 5418a.
Ob, or Obi, 4327d.
Obelisk, 1417c, 4328a.
Oberammergau, Bavaria, 4328c.
Oberhessen, Hesse, 2788b.
Oberland Plateau, 2762a.
Oberlin, Jean Frederic, 4329a.
Oberlin College, 4328c.
Oberrealschule, 2472b.
Oberstein, Germany, 3645d.
Obesity, 4329a.
Obi, 4327d.
Object glass, 5743b.
Objective case, 1213c.
Objective mind, 5737a.
Objective of a telescope, 5743b.
Object lens, 5743b.
Object of a preposition, 4808a.
Oblong spheroid, 5495c.
Oboe, 4330a.
Obovate leaf, 3361c.
Observation mines, 5604c.
Observatory, 4330b.
Observatory at Greenwich, 2620d.
Obsidian, 4330d.
Obsidian cliff, 4330d, 6391c.
Obtuse angle, 255d.
Obtuse triangle, 5876a.
Obverse of coin, 4311c.
Ocarina, 4331a.
Occasional northeasterly winds, 6309d.
Occipital, 2738d.
Occult, 4331a.
Occultation, 1915a, 4331d.
Occupational neurosis, 4131c.
Occupational training, 1943c.
Ocean, 2434c, 4332a, 4335b.
Ocean currents, 4333a.
Ocean Grove, N. J., 4163b.
Oceania, 4336b; colored map, facing 4336.
Oceanic islands, 3070d.
Oceanids, 4321c.
Oceanography, 4336b.
Ocean routes, 4335b; map of, 4336a.
Ocean sunfish, 5639d.
Ocelot, 4336d.
Ocher, or ochre, 4337a.
Ochro, 4366b.
O'Connell, Daniel, 4337b.
O'Connell, William Henry, 4337b.
Octave (fencing), 2151c.
Octave (music), 4022a, 4337c.
Octave of sonnet, 5440b.
Octavia, 4337d.
Octavius, or Octavianus, 476d.
October, 4340a.
Octopus, 4340d.
Odd Fellows, Independent Order of, 4341a.
Ode, 4341d.
Odelsthing, 4288a.
Odenathus, 6410d.
Odense, 4342a.
Oder River, 4342b.
Odessa, Russia, 4342b.
Odin, 4043b, 4342d.
Odoacer, 4342d.
Odonata, 3001a.
Odontolite, 5919d.
Odyssey, 4343b.
Oedipus, 4344a.
Oehlenschlager, Adam, 1758d.
Oenone, 4499b, 5887c.
Oenopion, 4413d.
Oesel Island, 6164d.
Oesophagus, 201a.
Oetaea, 318a.
Offenbach, Jacques, 4390b.
Officers, Army, 381a.
Officers of a society, 4509c.
*Of Studies*, 2079d.
Ogden, Utah, 4344c.
Ogdensburg, N. Y., 4345a.
Og, king of Bashan, 2489d.
Oglethorpe, James, 2458c, 4345b.
Oglethorpe's fort, 2457d.
Oglethorpe University, 4345d.
"Ō-grab-me" Act, 6141a.
O. Henry, 4769b.
Ohia, 2718d.
O'Higgins, Bernardo, 1335b.
Ohio, 4281b, 4346a.
Ohio Canal, 1147a, 4352a.
Ohio Company, 4355b.
Ohio River, 4355c.
Ohio River floods, 2210b.
Ohio River project, 1146c.
Ohio State University, 4356a.
Ohm, 4356b.
Ohm, Georg Simon, 4356c.
Ohm's law, 4356b.
Oil City, Pa., 4356c.
Oilcloth, 4357a.
Oil fields, Map of, 4614c.
Oil gas, 4484d.
Oil of bergamot, 690a.
Oil of mace, 4315a.
Oil of peppermint, 4579a.
Oil of tansy, 5698d.
Oil of turpentine, 5919b.
Oil of vitriol, 5621a.
Oil palm, 4463a.
Oils, 4357a.
Oils, Adulteration of, 62d.
Oil varnishes, 6038b.
Oil wells, 4614b, 5773d.
Ojeda, 4692c.
Ojibwa Indians, 4357d.
Okanagan Lake, 4576c.
Okanogan Highlands, 6187c.
Okanogan project, 6188b.
Okapi, 4358a.
Oka River, 6112d.
Okechobee, Battle of, 5718b.
Okechobee, Lake, 4358a.
Okefinokee Swamp, 2454d.
Okhotsk, Sea of, 4358c.
Oklahoma, 2971c, 4358b.
Oklahoma, University of, 4365c.
Oklahoma City, Okla., 4365d.
Okra, 4366b.
Olaf, 4288b.
Oland Island, 5646b.
Old age pensions, 4366b.
Old age theory, 3754b.
Old Bay State, 3682b.

"Old Bullion," 3855a.
Old Cambridge, 1076d.
Old City Gate, Saint Augustine, 5145a.
Old Constitution House, Vermont, 6065b.
Old Dominion, 6091b.
Oldenburg, Germany, 4367a.
Old English, 2051c.
"Old Faithful," 6389b.
Old Forge, Pa., 4367c.
"Old Fuss and Feathers," 5269b.
"Old Guard," 6217b.
Oldham, Eng., 4367d.
*Old Ironsides*, 1558b.
*Old King Cole*, 3317c.
Old Line State, 3670a.
Old-man cactus, 1039c.
"Old Man Eloquent," 38a.
Old man kangaroo, 3202c.
Old Man of the Mountain, 4157d, 6275a.
Old Man of the Sea, 4118b.
Old Manse, The, 2726b.
Old Mill, 6088b.
Old North Church, 847a.
Old North State, 4259a.
Old Ontario, 4379c.
Old Point Comfort, Va., 4368a.
Old Pretender, 5593d.
Old Red Sandstone, 4368a, 5189a.
"Old Rough and Ready," 5719b.
Old South Meeting House, 846d.
Old Spanish Inn, Natchez, Miss., 3848b.
Old Stone Mill, R. I., 4276b.
Old Swedes' Church, Philadelphia, 4623b.
*Old Testament*, 705c, 2755d.
Old Testament prophecy, 4842d.
Old witch grass, 2576b.
Old woman's summer, 2971a.
Old-World yew, 6393b.
Olean, N. Y., 4368b.
Oleander, 4368c.
Olein, 3334c.
Oleomargarine, 62c, 1020d, 4368c.
Oleoresins, 4978d.
Olfactory cells, 5410c.
Olfactory nerves, 891b, 4121a.
Olifants River, 5863c.
Oligarchy, 346a, 4369a.
Oliphant, Laurence, 4369b.
Oliphant, Mrs. Margaret, 4369c.
*O Little Town of Bethlehem*, 952d.
Olive, 4369d.
Olive and yellow weaver bird, 6232d.
Olive bottles decorated, 2984d.
Olive oil, 4370b.
Oliver, Frank, 4370d.
Oliver Optic, 4371a.
*Oliver Twist*, 1789d.
Olives, Mount of, 4371b.
Olive wood, 4370a.
Olmsted, Frederick Law, 4371c, 6194b.
Olney, Richard, 3902a, 4371d.
Ol Obeid, 3277a.
Olympia, 4372a.
Olympia, Wash., 4372b.
Olympiad, 4372d.
Olympian council, 4373c.
Olympian games, 4372d.
Olympian Zeus, 5318b.
Olympian Zeus, Temple of, 4372a.
Olympias, 4628a.
*Olympic*, The, 5354b.
Olympieum, 454a.
Olympus, 4373c.
Olyphant, Pa., 4373d.
Omaha, Neb., 4374a.
Oman, 4375c.
Omar, Caliph, 2758d, 3142d.
Omar Khayyam, 3697a, 4375d.
Omene, 4375d.
Ometepe Island, 4228b.
Omnibus Bill, 4376a, 5722a.
Omphale, 2780c.
Omri, 5181a.
Omsk, Siberia, 4376a.
*On Conciliation with America*, 1004c.
*One Country*, 5527d.
Onega, Lake, 4376b.
One hundred famous paintings, 4450a.
Oneida Community, 1516d, 4376c.
Oneida Indian Reservation, 2616b.
Oneida Indians, 4376b.
Oneida Lake, 4377a.
O'Neill, James, 3911d.
O'Neill, Shayne, 3051a.
Oneonta, N. Y., 4377a.
Oneyotka-one, 4376c.
Onion, 4377c.
Onlik (coin), 1468c.
Onondaga, Lake, 4196c.
Onondaga Indians, 4378c.
Ontario, 946b, 4378b.
Ontario, Lake, 2596c, 4387c.
*Onward Christian Soldiers*, 2895d.
Onyx, 4388a.
Onyx marble, 4388a.
Oolong tea, 5724b.
Oom Paul, 3279c.
Opal, 4388b.
Open-air schools, 5243a.
Open-circuit batteries, 1981d.
Open-door policy, 1424c.
Open-hearth steel, 5542c.
Open-kettle method of canning, 2247d.
Open punctuation, 4870d.
Open season, 258a, 2372d.
Open shop, 4388d.
Opera, 4389a.
Opera bouffe, 4390b.
Opera dramatica, 4389a.
Opera glass, 4390d.
Opera seria, 4389a.
Ophir, 4391a.
Ophir, Mount, 3167a.
Ophthalmia neonatorium, 769b.
Ophthalmoscope, 4391a.
Opium, 202d, 282b, 3719a, 4391b.
Opium war, 4391c.
Oporto, Portugal, 4392a.
Opossum, 4392b.
Opper, Frederick Burr, 4392d.
*Opportunity*, 2992a.
Opposite arrangement of leaves, 3361d.
Opposition (astronomy), 1540a.
Optic nerve, 2118b, 4121a.
Optics, 3424a.
Optimism, 4393a.
Optophone, 3028b.
Oracles, 4393a.
Oral law, 5693b.
Oral reading, 4940b.
Oran, Algeria, 4393c.
Oran, Gulf of, 4393c.
Orange, 4393d.
Orange (color), 4395a.
Orange, N. J., 4395b.
*Orange Book*, 782a.
Orange chionaspis, 4395a.
Orange-flower water, 4394c.
Orange Free State, 4395d.
Orange hawkweed seed, 6238b.
Orangemen, 2592c, 6291a.
Orange peel, 4394c.
Orange River, 4396c.
Orange River Colony, 4396b.
Orange sulphur butterfly, facing 1022.
Orang-utan, 4396d.
Oration, 4397b.
Oratorio, 4398b.
"Orator of secession," 6382b.
Orbicular leaf, 3361a.
Orbit, 4695a.
Orbit of the moon, 3940c.
Orbit of Venus, 6054b.
Orcagna, Andrea, 5275a.
Orchard grass, 2576b.
Orchard House, 171b.
Orchard houses, 2617c.
Orchestra, 4398c.
Orchestral trumpet, 5890c.
Orchid, facing 2224, 4400a.
Orcus, 4712a.
Ordeal and combat, Trial by, 4400c.
Ordeal by fire, 4400d.
Ordeal by water, 4400d.
Order (biology), 1410b, 4401a.
Order of Eagles, 2318d.
Order of Elks, 2014d.
Order of prepositions, 4808d.
Order of Owls, 2319a.
Order of Penance, 2310a.
Order of subject and predicate, 5304a.
Order of the Garter, 2396a.
Order of the Iron Cross, 780b.
Order of the Thistle, 5793b.
Orders, Religious, 3882d.
Orders in Council, 4401b.
Orders of architecture, 1507b.
Orders of knighthood, 3268c.
Ordinance of 1787, 4401c, 5236b, 5238b.
Ordinance of Secession, 6145d.
Ordinances, 5537b.
Ordnance, 402b.
Ordovician Period, 4401d.
Ore (coin), 1468c.
Oreads, 4321c.
Oregon, 4402a, 6276c.
*Oregon* (cruiser), 5481a.
Oregon, University of, 4406d, 4410c.
Oregon maple, 3643a.
Oregon pine, 5512c.
Oregon Plan, 2993d.
Oregon Question, 4408c, 4740a.
Oregon Trail, 4408d.
O'Rell, Max, 4410d.
Orellana, Francisco de, 5453a.
Orenburg, Russia, 4411a.
Orestes, 4411a.
Orestes (Roman history), 4343a.
Organ, 4411b.
Organic chemistry, 1298b.
Organic diseases, 1804c.
Organized territory, 5764b.
Organ of Corti, 1900a.
Organ rock, 6011b.
Organzine, 5382c.
Oriental immigration, 1068a.
Oriental poppy, 4760c.
Oriental rubies, 5100d.
Oriental rugs, 1199b.
Oriflamme, 4412c.
Origen, 4412d.
Original jurisdiction, 1614b.
*Origin of Species*, 1705d.
Orilla, Ont., 4413a.
Orinoco River, 4413b.
Oriole, 4413c.
Orion, 4413d.
Orion, Nebula of, 4108a.
Oriskany, Battle of, 896b, 4202c, 5157d.
Orizaba, Mount, 3767d, 5044d.
Orleans (family), 4414b.
Orleans, France, 4414d.
Orleans, Siege of, 2167c.
Orkney Islands, 4413d.
*Orlando*, 5050c.
Orloff diamond, 1786b, 2414c.
Ormazd, 6419a.
Ormazd Island, 4596c.
Ormuz, Strait of, 4596b.
Ornithology, 4415a.
Oronhyatekha, 4415a.
Orontes River, 284c.
Orphans (political), 2881c.
Orpheus, 4415b.
Orphic mysteries, 4040b.
Orris root, 4415d.
Orsini (family), 4416a.
Orthoceras, 4416a.
Orthoclase, 2150b.
Orthodontia, 1946d.
Orthodox Quakers, 4884a.
Orthopedics, 4416b.
Orthoptera, 3001a, 4416c.
Ortolan, 4416d.
Ortygia, Island of, 5670c.

Oryoku River, 1364b, 6381c.
Oryx, 278d.
Oryza, 5005d.
Osage Indians, 4417a.
Osage melon, 4034c.
Osage orange, 4417b.
Osaka, Japan, 4417d.
Osawatomie Brown, 955a.
Osborne, Thomas Mott, 5392b.
Osbourne, Mrs. Fanny, 5552b.
Oscar I, II, 4418a.
Osceola, 4418c.
Oscillations of pendulum, 4558d.
Oshawa, Ont., 4418d.
Oshkosh, Wis., 4419a.
Osiris, 4419c.
Oskaloosa, Ia., 4419c.
Osler (family), 4419d.
Osman, 5128b, 5912a.
Osmium, 4420c.
Osmosis, 4420d.
Osmotic pressure, 4421a.
Osnaburg, 4421a.
Osnabruck, 4421a.
Osprey, 2189d.
*Ossa innominata*, 4555c, 5399c.
Osseous tissue, 5818c.
Ossining, N. Y., 4421b.
Ossoli, Sarah Margaret Fuller, 4421c.
Ostend, Belgium, 4422a.
Ostend Manifesto, 969c, 1660d, 4422b, 4668b.
Ostensible partners, 4519a.
Osteopathy, 4422b.
Osterö Island, 2138c.
Ostracism, 1434c, 4422c.
Ostracoderm, 2440b.
Ostrich, 4422d.
Ostrich farming, 1168b.
Ostrogoths, 2542d.
Oswego, N. Y., 4424c.
Oswego Canal, 1147a, 4216d.
Oswego tea, 561b.
Othello, The Moor of Venice, 4425a.
Othman, 5912a.
Otho I, II, III, 4425b.
Otho, Marcus Salvius, 4426a.
Otis, James, 4426a, 6364c.
Otoska, 2885a.
Otranto, Strait of, 3032d.
Ottawa, Ill., 4429a.
Ottawa, Ont., 4426b.
Ottawa, University of, 4429b.
Ottawa Forest Reserve, 4890a.
Ottawa Indians, 4428d.
Ottawa-Rideau Canal, 5014a.
Ottawa River, 4429c.
Otter, 4429d.
Otter, Sir Wm. D. Dillon, 4430b
Otter Creek, 6066d.
Otto I, 4430d.
Ottoman Empire, 5907a.
Ottumwa, Ia., 4431a.
Ouachita Mountains, 4441c.
Ouachita River, 6210c.
Ouida, 4927c.
Ouinaniche, 5142b.
Ouistiti, 3657c.
Ounce (animal), 4431c.
Ounce (weight), 4431b.
Outcault, Richard Felton, 4431c.
Outdoor advertising, 68c.
Outer City, 4552d.
Outer Mongolia, 3889b.
Outer tube of tire, 4715c.
Outlawed debt, 1724d.
Outline on—
  Abyssinia, 16a.
  Adams, John, 32a.
  Adams, John Quincy, 37a.
  Addition, 51b.
  Adjective, 56b.
  Adverb, 66c.
  Advertising, 69a.
  Afghanistan, 75c.
  Africa, 86a.
  Agriculture, 112a.
  Air, The study of, 118c.
  Alaska, 144a.
  Albania, 148c.
  Algebra, 197c.
  Alps, 213c.
  Ambition, 224b.
  American Literature, 231a.
  Andes, 250d.
  Ant, 272a.
  Apple, 299a.
  Arabia, 310a.
  Architecture, 328a.
  Argentina, 340a.
  Arithmetic, 353a.
  Army, The, 383a.
  Arthur, Chester A., 397a.
  Article, The, 400d.
  Asia, 422a.
  Astronomy, 447a.
  Assyria, 434a.
  Athens, 455c.
  Athletics, 458c.
  Atlantic Ocean, The, 462c.
  Attention, 468a.
  Australia, 492a.
  Austria-Hungary, 508a.
  Baby, The, 530a.
  Babylonia, 534a.
  Bacteria and bacteriology, 538c.
  Balkan Wars, The, 555c.
  Banks and Banking, 583a.
  Baseball, 609a.
  Basket ball, 611a.
  Basketry, 615c.
  Bear, The, 636c.
  Beaver, The, 642a.
  Bees, 654a.
  Beetle, The, 662a.
  Belgium, 672a.
  Berlin, 695a.
  Bible, The, 709a.
  Birds, 744a.
  Bolivia, 799a.
  Boston, 851a.
  Botany, 863a.
  Brazil, 904a.
  Buchanan, James, 972a.
  Buenos Aires, 980c.
  Bulgaria, 992a.
  Butterfly, The, 1024a.
  Canada, 1134a.
  Canadian Literature, 1142a.
  Chemistry, 1297a.
  Chicago, 1315a.
  Chile, 1336a.
  China, 1350a.
  Circulation, 1389a.
  City, A, 1394c.
  Cleveland, Grover, 1423a.
  Coal, 1445a.
  Colombia, 1479c.
  Columbus, 1503c.
  Corn, 1588a.
  Cotton, 1609a.
  Cuba, 1659a.
  Denmark, 1761a.
  Drama, 1853a.
  Ecuador, 1921c.
  Egypt, 1972a.
  England, 2048a.
  English Literature, 2054a.
  Europe, 2100a.
  Fillmore, Millard, 2173a.
  Fly, The, 2233a.
  Football, 2259a.
  France, 2306a.
  Garfield, James A., 2391c.
  Germany, 2480a.
  Grammar, 2556c.
  Grant, U. S., 2571a.
  Great Britain, 2593a.
  Greece, 2609a.
  Harrison, Benjamin, 2699a.
  Harrison, William H., 2705c.
  Hawaii, 2722c.
  Hayes, Rutherford B., 2733a.
  Honor, 2829c.
  Ireland, 3053a.
  Italy, 3085a.
  Jackson, Andrew, 3097a.
  Japan, 3123a.
  Jefferson, Thomas, 3133a.
  Johnson, Andrew, 3161a.
  Lincoln, Abraham, 3443a.
  London, 3491a.
  McKinley, William, 3574a.
  Madison, James, 3583a.
  Mexico, 3772a.
  Monroe, James, 3899a.
  Montreal, 3937a.
  Netherlands, The, 4127a.
  New Zealand, 4221c.
  North America, 4254a.
  Norway, 4287a.
  Noun, The, 4295d.
  Ottawa, 4428a.
  Paraguay, 4487a.
  Patriotism, 4527b.
  Peru, 4602c.
  Philippine Islands, 4637a.
  Pierce, Franklin, 4669a.
  Polk, James K., 4741a.
  Porto Rico, 4775c.
  Portugal, 4784a.
  Pronoun, The, 4840a.
  Province, The, 4851a.
  Prussia, 4855a.
  Roosevelt, Theodore, 5075a.
  Rumania, 5106a.
  Russia, 5124a.
  Scotland, 5263a.
  Sentence, The, 5305b.
  Serbia, 5313c.
  South America, 5452a.
  Spain, 5478a.
  State, A, 5534c.
  Sweden, 5650a.
  Switzerland, 5665a.
  Taft, William Howard, 5685a.
  Taylor, Zachary, 5721a.
  Turkey, 5915a.
  Tyler, John, 5927a.
  United States, The, 5996a.
  Van Buren, Martin, 6030a.
  Venezuela, 6050a.
  Verb, The, 6058a.
  Washington, George, 6207a.
  Wilson, Woodrow, 6307a.
Out-of-door games, 2375d, 2377d.
Outpost provinces, 1910c.
Outram, Sir James, 4431d.
Outremont, Que., 4432a.
Ouzel, 4432b.
Ovary, 2224b.
Ovate leaf, 3361a.
Ovation, 5883a.
Oven bird, 4432c.
Ovenette, Electric, 1988b.
Oven temperature, 1567b.
Overbeck, Friedrich, 4455a.
Overeating, 3412c.
Overhand knot, 3270a.
*Overhead Race* (game), 2377a.
Over the Rhine, 1380d.
Overshot wheel, 6221d.
Overtones, 5445c.
Overweight, 3412c.
Ovid, 4432d.
Ovules, 2224b.
Owen, Robert, 4433a.
Owen Meredith, 3547d.
Owensboro, Ky., 4433c.
Owen Sound, 4433d.
Owl, 4434b.
*Owl and the Pussy-Cat*, 3319d.
Owl parrot, 4513d.
Ownership by descent, 5820d.
Ownership by purchase, 5820d.
Owosso, Mich., 4435b.
Owyhee River, 4134b.
Oxalates, 4435c.
Oxalic acid, 282b, 4435c.
Ox-cart, 4919a.
*Oxen Going to Work*, 4452.
Oxenstierna, 5792b.
Oxford, Eng., 4435d.
Oxford crown, 1649b.
Oxford Movement, 4170b, 4436a.
Oxford University, 4436b.
Oxidation, 4437a.
Oxus River, 4466d.
Oxygen, 464a, 4437a.
Oxygenated water, 2889a.
Oxyhydrogen flame, 2888c.
Oxyhydrogen light, 3434a.
Oyama, Iwao, Prince, 4438a.

Oyster, 4438b.
Oyster catcher, 4441a.
Oyster farms, 4440b.
Oyster mushroom, 4014b.
Oyster plant, 4441b.
Ozaka, Japan, 4417d.
Ozark Mountains, 4442b.
Ozone, 4441c.

# P

P, 4442a.
Pachomius, Saint, 3883b.
Pacific, Control of the, 5967d.
Pacific blockade, 773b.
Pacific cables, 1038a.
Pacific fisheries (Canada), 1107c.
Pacific Ocean, 4332d, 4442a.
Pacific time, 5524b.
Pacific trade routes, 5967a.
Pacific valleys, 5948b.
Pacific yew, 6393c.
Packing industry, 3711a.
Pack train, 4919a.
Pactolus River, 3792d.
Padang, Sumatra, 5622d.
Paddlefish, 4443b.
Paddy, 5007b.
Paddy bird, 5007b.
Paderewski, Ignace Jan, 4443b.
Padua, Italy, 4443d.
Paducah, Ky., 4444a.
Paduke, 4444c.
Paeonius, 5274a.
Paganini, Niccolò, 4444c.
Page, David Perkins, 4445a.
Page, Thomas Nelson, 4445a.
Page, Walter Hines, 4445b.
Pagoda, 4445d.
Pagopago, Samoa, 5182a.
Pagus, Mount, 5418c.
Pahang, Malay States, 2148d.
*Pail mail* (game), 1645c.
Paine, Thomas, 4446a.
Painless dentistry, 1769b.
Paint, 4446d.
Painted bunting, 999b.
Painted Desert, 355b.
Painted Porch, 6410d.
Painted Rocks, 6258b.
Painted trillium, 5879d.
Painter etching, 2081d.
Painting, 4447a.
Paintings, Twelve great, 4455d.
Paints, 4447c.
Paisley, Scotland, 4456b.
Paisley terrier, 5402d.
Pakenham, Sir Edward Michael, 4177c, 4456c.
Palace of—
Heavenly Purity, 4551d.
Peace, 2657a.
Versailles, 6071b.
Paladino, Eusapia, 5502b.
Palais de l' Elysée, 4496d.
Palais Royal, 4456d.
Palamedes, 5936b.
Palanquin, 4457.
Palate, 4457a.
Palatinate, 4457b.
Palatine Hill, 5064a.
Palawan Island, 4632b.
Pale brandy, 895c.
Palembang, Sumatra, 5622c.
Paleocrystic ice, 331c.
Paleolithic Period, 5559b.
Paleontology, 4457c.
Paleozoic Era, 2440d, 4457d.
Pale primrose, 1620a.
Palermo, Sicily, 4457d.
Palestine, 4458b.
Palestine, Tex., 4459c.
Palestine shepherd, 417c.
Palestrina, Giovanni Pierluigi da, 4020b, 4460a.
Palimpsest, 4460b.
Palisades, 4201d, 4460d.
Palisades Interstate Park, 4460d.
Palissy, Bernard, 4461a.
Palladio, Andrea, 6075d.
Palladium (metal), 4461a.
Palladium (myth), 4461b.
Pallas Athene, 4461c.
Pallium, 4756a.
Palm, 4461c.
Palma, Spain, 4463b.
Palma, Tomas Estrada, 4463b.
Palmar arch, facing 1388.
Palmar digital artery, facing 1388.
Palmately compound leaf, 3361b.
Palm Beach, Fla., 4463c.
Palmer, Alice Freeman, 4463d.
Palmer, Dr. D. D., 1357d.
Palmer, George Herbert, 4464a.
Palmer, Ray, 2896a.
Palmerston, Henry John Temple, 4464a.
Palmetto, 1034c, 4464c.
Palmetto State, 5455d.
Palming, 1542b.
Palmistry, 4464c, 5637c.
Palm oil, 4465c.
Palm Sunday, 4465d.
*Palm-Tree, The*, 4462b.
Palmyra, Arabia, 4465d.
Palmyra palm, 4461c, 4466a.
Palo Alto, Battle of, 4466a.
Palo Alto, Cal., 4466b.
Palpitation of the heart, 2747b, 4466c.
Palyanka, 4457a.
*Pamela*, 4303b.
Pamir, 4466d.
Pamlico River, 4467c.
Pamlico Sound, 4467a.
Pampas, 3471a, 4467c.
Pan, 4467c.
Panama (city), 4470a.
Panama (republic), 4467b.
Panama, Isthmus of, 4470d.
Panama Canal, 1333c, 4471a, 5945d.
Panama Canal, color plate, Time Zones, facing 4472.
Panama Canal Zone, 2063a.
Panama hats, 1478d, 5590a.
Panama-Pacific International Exposition, 3401b, 3448b, 4474d.
Panama railroad, 5945c.
Pan-American Congress, 4475c.
Pan-American Exposition, 983b, 4476a.
Pan-American Union, 4475c, 4476b, 6196b.
Pancake Tuesday, 5365c.
Pancreas, 4476d.
Pancreatic juice, 4476d.
Pancreatin, 4477a.
Pandora, 4044a, 4477a, 4836d.
*Pandora, The Story of*, 4050a.
Pangkor, Island of, 5584a.
Panhandle (Okla.), 4365a.
Panhandle (Tex.), 5770a.
Panhandle State, 6251b.
Panic of 1837, 6028b.
Panic of 1873, 2570a.
Panjnad, 5642c.
Pankhurst, Christabel, 4477d.
Pankhurst, Emmeline, 4477b.
Pankhurst, Sylvia, 4477d.
Pannonia, 2543a.
Pansy, 4477d.
Pantagruel, 4907c.
Pantheism, 4478b.
Pantheon, 4478b.
Pantheon of Agrippa, 324d.
Panther, 4478d.
Pantisocracy, 5469c.
Pantomime, 4478d.
Paoli, Pasquale, 4063a.
Papal Guard, 5659c.
Papal insignia, 4756a.
Papal ring, 5021b.
Papal States, 4479a.
Papeete, Tahiti, 5427b.
Paper, 4479c.
Paper, Table for measuring, 1765d.
Paper barometer, 1451a.
Paper birch, 727d.
Paper blockade, 773a.
Paper dolls, 1831d.
Paper folding for kindergartens, 3242a.
Paper hangings, 6130b.
Paper money, 3886d.
Paper mulberry, 3996c.
Paper nautilus, 343b.
Paper white narcissus, 4068c.
Paphlagonia, 4653a.
Papier-mâché, 4481b.
Papilla, hair, 2659b.
Papillae, 5400d.
Papin, Denis, 4716b.
Papineau, Louis Joseph, 4481c, 4735d, 4947a.
Papoose, 2966a.
Paprika, 4482b.
Papua, 4154a.
Papyrus, 4482c.
Par, 5554c.
Para (coin), 1468c.
Pará, Brazil, 4483a.
Parable, 2122d, 4483b.
Parabola, 4483d.
Paracelsus, 1294a, 4484a.
Parachute, 4484b.
Paraclete, The, 8d.
*Paradise*, Tintoretto's, 5817d.
*Paradise Lost*, 3811b, 4484c.
Paradise Valley, 1095a.
Paraffin, 4484d.
Paraffin oil, 3233a.
Paraffin paper, 4481a.
Paraffin wax, 6227b.
Paraguari, Paraguay, 4486b.
Paraguay, 4485a.
Paraguay River, 4488b.
Paraguay tea, 3695c.
Parallax, 4488b.
Parallelogram, 3735a, 4882b.
Parallelogram of forces, 4489a.
Parallel veining in leaves, 3361c, 6046d.
Paralysis, 4489b.
Paramaribo, Dutch Guiana, 4489c.
Paramushiri Island, 3281c.
Parana River, 4489c.
Para nut, 908a.
Para rubber, 5097c.
Parasite, 4490a.
Parasites, Vegetable, 859d.
Parasitic diseases, 4490c.
Parasitic roots, 5078c.
Parasol mushroom, 4014c.
Parcel post, 4490c.
Parchment, 4492a.
Parchment paper, 1248a, 4492a.
Pardon, 4492b.
Parent and child, 4492c.
Parent and vocational guidance, 6106d.
Parentheses, Signs of, 189a.
Parentheses, Use of, 4872a.
Parents' duties and responsibilities, 4492c.
Parent - Teacher Association, 4493a.
Paresis, 4489c.
Parhelion, 4494a.
Paria, Gulf of, 4772d.
Pariah, 1218a.
Parietal, 2738d.
Parietal pleura, 4707a.
Paris (mythology), 4499b, 5887a.
Paris, France, 4494a.
Paris, Louis Albert Philippe d'Orleans, Count of, 4499d.
Paris, Ont., 4499a.
Paris, Tex., 4500a.
Paris, Treaties of, 4500a, 4989c.
Paris, University of, 4500d.
Paris Apaches, 290a.
Paris green, 1573c, 4501a.
Paris green, Antidote for, 282b.
Parisii, 4498c.
Park, Mungo, 4501b.
Parker, Alton Brooks, 4501c.
Parker, Francis Wayland, 4501d.
Parker, Sir Gilbert, 4502a.
Parker, Captain John, 3396d, 4986a.

Parker, John W., 4833b.
Parker, Sir Peter, 3976a.
Parkersburg, W. Va., 4502c.
Parkin, George Robert, 4502d.
Parkman, Francis, 4503a.
Park Range, 1486a.
Parks, National, 4503b.
Parlement, 4507c.
Parlement of Paris, 4507c.
Parliament, 2588b, 4507b.
Parliamentary law, 4509a.
Parliament building, Toronto, 1118b.
Parliament of Canada, 1116d.
Parlow, [Mary] Kathleen, 4510d.
Parma, Italy, 4511a.
Parmery, prica, cardia, 41b.
Parmesan cheese, 1291c.
Parnassus, 4511b.
Parnell, Charles Stewart, 4511c.
Parochial school, 5247a.
Parody, 4512a.
Parole, 4512b.
Parrakeet, 4512c.
Parral, Mexico, 3772a.
Parrhasius, 4513a.
Parrish, Maxfield, 4513b.
Parrish, Randall, 4513b.
Parrot, 4513c.
Parrsboro, N. S., 4514c.
Parry (fencing), 2151c.
Parry, Sir William Edward, 3726d, 3727a, 4514c.
Parry Sound, 4514d.
Pars, 4515a.
Parsees, 2487b, 4515a.
*Parsifal*, 4515b, 6122c.
Parsing, 4515d.
Parsing the—
  Adjective, 55b.
  Adverb, 65c.
  Article, 400b.
  Conjunction, 1540d.
  Noun, 4295a.
  Participle, 4518b.
  Preposition, 4809a.
  Pronoun, 4839b.
  Verb, 6057c.
Parsis, 4515a.
Parsley, 4515d.
Parsnip, 4516a.
Parsnip River, 4536c.
Parsons, Charles A., 5355c.
Parsons, Kan., 4516c.
Partes minutae primae, 3838d.
Partes minutae secundae, 3838d.
Parthenon, 324b, 454a, 2605d, 4516d.
Parthia, 4517b.
Partial indulgence, 2974a.
Participle, 4517c.
Particular partnership, 4518d.
Partington, Mrs., 5352b.
Partinium, 5900b.
Parti Rouge, 4736a.
Partitions of Poland, 4723a, 4724b.
Partners, 4518d.
Partnership, 4518c, 5554b.
Partridge, 4519b.
Partridge, William Ordway, 4519c.
Parts of—
  cow, 1618a.
  fowl, 4800b.
  grass, 2576a.
  leaf, 3362b.
  locomotive, 3478b.
  mushroom, 4014a.
  plants, 4698c.
  sentence, 5303c.
  speech, 4519d.
Pas, Le, Man., 4520a.
Pasadena, Cal., 4520b.
Pasargadae, Persia, 1683c.
Pascal, Blaise, 4520c.
Pascal's law, 4520c.
Pascal's theorem, 2890a.
*Pascua Florida*, 2212b, 4751b.
Pasha, 4520d.
Pashalik, 4521a.
Pasig River, 3624c.
Pass (geography), 6022d.
Passaic, N. J., 4521a.
Passaic River, 4163c, 4525a.
Passamaquoddy Indians, 199b.
Passau, Treaty of, 5235a.
Passenger pigeon, 4521b, 4671a.
Passion flower, color plate, facing 2224; 4521c.
Passion Play, 4521d.
Passion Week, 3146b.
Passive attention, 467a.
Passive voice, 6110b.
Passover, 4522a.
Passport, 4522b.
Paste, 2413d.
Pastel, 1627b.
Pasteur, Louis, 4522c.
Pasteur Institute, 4523a.
Pasteurization of milk, 3803c.
*Pastoral Epistles*, 5815c.
*Pastoral Madonna*, 3586a.
Pastoral nomadism, 4244d.
Pastoral poetry, 4523a.
Past participle, 4517c.
Past perfect tense, 5757c.
Past tense, 5757b.
Pasture grasses, 2577a.
*Pat-a-cake, pat-a-cake, baker's man*, 3316b.
Patagonia, 4523c.
Patagonian rabbit, 4907a.
Patagonians, 1331c.
*Pâté de foie gras*, 2535c.
Patella, 5399b.
Patent, 4523c.
Patent leather, 4140a.
Patent medicines, 3415b, 3720c.
Patent Office building, 6195c.
Patepedia River, 4979a.
Paterson, N. J., 4525a.
Paterson, William, 4524d.
Pathology, 4525c.
*Patience* (game), 5434c.
Patmos, 4525c.
Patna, India, 4525d.
Patriarch, 4526a.
Patriarchal cross, 1646b.
Patriarch of Constantinople, 2610a.
"Patriarch of New England," 1610b.
"Patriarch of the trees," 4322b.
Patrician, 4526a, 5057d.
Patrick, Saint, 4526b.
Patriotism, 4526d.
Patrons of Husbandry, 2563b.
Patrons of Industry, 2563b.
Patroon system, 4527d.
Patten Gymnasium, 2646c.
Patterson, Elizabeth, 805c.
Patti, Adelina Juana Maria, 4528a.
Patroclus, 2757c, 2919d.
Paul (Popes), 4528c.
Paul, John, 3170d.
Paul, Saint, 4529a.
Paul I (Russia), 4530a.
*Paul and Virginia*, 5166b.
Paulists, 4530b.
Paul Revere's house, 847d.
*Paul Revere's Ride*, 4982d.
Paul's *Epistles*, 4530a.
Pauncefote, Julian, First Baron, 4530c.
Pauperism, 4530d.
Pavement, 4531a, 5029a.
Pavements, Comparative life of, 5030c.
Pavia, Italy, 4531a.
Pavia, University of, 4531b.
Paving bricks, 918d.
Paving cement, 425d.
Pawcatuck River, 4997c.
Pawnbroker, 4531c.
Pawnee Indians, 4532a.
Pawpaw, 4532b.
Pawtucket, R. I., 4532c.
Pawtucket River, 4532d.
Pawtuxet River, 4997b.
Payne, John Howard, 4533b.
Payne-Aldrich Tariff Act, 5681b.
Paysandu, Uruguay, 6006d.
Pe, 4442c.
Pea, 4533d.
Peabody, George, 4535a.
Peabody, Mass., 4534c.
Peabody, Sophia, 2726a.
Peabody Education Fund, 4534a.
Peace, Breach of the, 4535a.
Peace, League to Enforce, 4535b.
Peace Conference, International, 4535b.
Peace of Augsburg, 1277b.
Peace offering, 5138a.
*Peace of God, The*, 5151a.
Peace of Utrecht, 6017d.
Peace Palace, 4535c.
Peace River, 4536b.
Peace River Country, 2627c, 4537a.
Peach, 4537d.
Peacock, 4539c.
Peale, Charles Wilson, 4540a.
Peale, Rembrandt, 4540b.
Peanut, 4540d, 4778d.
Pear, 4542b.
Pearl, 4543b.
Pearl buttons, 1028c.
Pearl divers, facing 4543.
Pearled barley, 593b.
Pearl fisheries, 4543c.
Pearl Harbor, H. I., 2721a, 4322a.
"Pearl of the Antilles," 1655a.
"Pearl of the Canadian Rockies," 3511d.
"Pearl of the Orient," 1257d.
Pearl spar, 1834c.
Pearl type, 5930d.
Peary, Robert Edwin, 4543d, 4725b.
Peasant War, 4544c.
Peat, 4544d.
Peat moss, 3969c.
Pecan, 4545d.
Peccary, 4546b.
Pecci, Gioacchimo Vincenzo Raffaello Luigi, 3381d.
Pechili, Strait of, 4765d.
Peck, James, 2935d.
Peck, Samuel Minturn, 4546c.
Pecos River, 4546d, 5769b.
Pecos viaduct, 5773a.
Pectase, 3137b.
Pectin, 3137b.
Pectoral arch, 5399c.
Pectoral muscles, 373a.
Pedagogue, 4547a.
Pedagogy, 4546d.
Pedal harp, 2692d.
Pedersen, Christian, 1758c.
Pedestrian curricule, 713a.
Pediment, 4548b.
Pedometer, 4548c.
Pedro II (Brazil), 906c, 4548c.
Pedro V (Portugal), 4784c.
Pedro Arias de Avila, 4470b.
Pedro Miguel locks, 4472d.
Peduncle, 3472d.
Peekskill, N. Y., 4548d.
Peel, Sir Robert, 4549a.
"Peelers," 4549b.
Peen-to peach, 4538c.
Peeping Tom, Legend of, 2520b.
Peer, in America, 4550b.
Peer and peerage, 4549d.
*Peer Gynt*, 2901d.
Peers, House of, 3120d.
Peewit, 3332d.
Pegasaean Gulf, 5789b.
Pegasus, 4550c.
Peh-kuh-ta, 4446a.
Pei-ho River, 4551a.
Peipus, Lake, 5114c.
Pekan marten, 3667a.
Pekin, Ill., 4550d.
Peking, China, 4551a.
Pelagic fishes, 6416b.
Pelagius II, 2621b.
Pelasgians, 2604b.
Pelée, Mount, 3668a.
Pelegrina diamond, 2414c.
Pelias, 343d, 2527a, 3715d.
Pelican, 4553b.
Pelican Island, 4554a.

Pelican State, 3512b, 4553c.
Pellagra, 4554a.
Pellegrini, Carlos, 339b.
Pellegrino, Mount, 4458a.
Pelletier, Louis Philippe, 4554c.
Pelly River, 6404b.
Pelopidas, 4554d.
Peloponnesian War, 2606d, 4555a.
Peloponnesus, 4555b.
Pelops, 4555c, 5698d.
Pelvic arch, 5399c.
Pelvis, 4555c.
Pemberton, John Clifford, 4555d.
Pemberton mine, 5628c.
Pembina River, 4270a.
Pembroke, Ont., 4555d.
Pemigewasset River, 3748a.
Pemmican, 4556a.
Pen, 4556b.
Pen, How to hold a, 4561a.
Peña, Dr. Saens, 339b, 342a.
Penance, 4557a, 5052b.
Penang, 4557b.
Penates, 3335a.
Pence, 4574a.
Pencil, 4557c.
Pendant, 4558a.
Pendentive, 4558b.
Pendulum, 2032c, 4558d.
Penelope, 4559c.
Penetanguishene, Ont., 4559d.
Peneus River, 471d, 5789d.
Penguin, 4560a.
Peninsular State, 3780b.
Peninsular War, 4065c, 6244a.
Peninsula State, 2212b.
Penitentiary, 4827b.
Penmanship, 4560c.
Penn, Mount, 4943d.
Penn, William, 4561d, 4572d, 4622c.
Pennell, Joseph, 4562d.
Pennine Chain, 2038b.
Penn Mansion, 4622c.
*Penn's Treaty with the Indians*, 4452.
Penn's Woods, 4563b.
Pennsylvania, 4563a.
Pennsylvania, University of, 4573c.
Pennsylvania Avenue, Washington, D. C., 6194c.
Pennsylvania Canal, 1147b.
Pennsylvania Dutch, 4563d.
Pennsylvania period, 1179d.
Penn Treaty Square, Philadelphia, 4624a.
Penny, 4574a.
Penny banks, Canadian, 5226b.
Pennyroyal, 4574a.
Penobscot River, 4574b.
Pensacola, Fla., 4574c.
Pension, 4574d.
Pension building, 6195c.
Pensions (public houses), 2848b.
Pensions in Canada, 4576a.
Pensions in the United States, 4575a.
Pension systems of Europe, 4576a.
Penstock (in turbines), 5904c.
Pentameter, 3756a.
Pentateuch, 4576b.
Pentecost, 4576b.
Pentelicus, Mount, 2604a.
Penticton, B. C., 4576c.
Pentland Firth, 4413d.
Penumbra, 4577a, 5330c.
Peon, 4577b.
Peonage, 130d, 1335d, 4577b.
Peony, 4577c.
"People of the stone," 4376c.
People of the United States, 5949b.
People's party, 4577d, 4762a.
Peoria, Ill., 4577d.
Pepin, 4578c.
Pepin of Heristal, 4578c.
Pepin the Elder, 4578c.
Pepin the Short, 4578c.
Peplos, 1860b.
Pepper, 4578d.
Pepper-grass, 1632c.
Peppermint, 4579a.
Pepsin, 2153a, 3713c, 4579b.
Peptones, 4579b.
Pepys, Samuel, 4579c.
Pequot Indians, 4579d.
Pera, 2527c.
Perak, Malay States, 2148d.
Percentage, 4580a.
Perception, 4583a.
Perch, 4583d.
Percha, 2645b.
Percherons, 2840c.
Percivale, Sir, 2813c.
Perdiccas, 4627d.
Peregrine falcon, 2130d.
Perennials, 267b, 4584b.
Perennial weeds, 6239a.
Perez, Juan, 4408b.
Perfect child, 531b.
Perfecting press, 4826a.
Perfectionists, 4376d.
Perfect participle, 4517c.
Perfect tenses, 5757b.
Perforative peritonitis, 4587b.
Perfume, 4584c.
Perfumes, Flowers in, 2225d.
Pergamus, Asia Minor, 5274c.
Peri, Jacopo, 4020b.
Periander, 5318d.
Peribonka Park, 4890a.
Peribonka River, 5142b.
Pericarditis, 2747c, 4585c.
Pericardium, 2745a, 3727b, 4585c.
Pericles, 4585c.
Perictione, 4702c.
Perigee, 304b, 4586b.
Perigon, 256a.
Perihelion, 304c.
Perilymph, 1900a.
Perimeter, 4745c.
Period (time), 2438b.
Period, Use of, 4871a.
Periodic springs, 5509a.
Periodic wind, 6310b.
Period in Hindu notation, 4291d.
Period of oscillation, 4558d.
Perioeci, 5483b.
Periosteum, 809d, 3727c.
Peripatetic School of Philosophy, 346c, 4586c, 4641d.
Perique tobacco, 5823d, 5824c.
Periscope, 4586d, 5602b.
Peritoneum, 7b, 3727b, 4587a, 5503c.
Peritonitis, 4587b.
Perjury, 4587b.
Perkins Institute for the Blind, 770d, 849a.
Perley, Sir George Halsey, 4587c.
Permian Period, 2440d, 4588a.
Pernambuco, Brazil, 4588b.
Peroxide of hydrogen, 2889a.
Perpendicular style, 5897d.
Perper, 1468c.
Perpetual calendar, 1052a.
Perpetual injunction, 2994d.
Perpetual motion, 4588d.
Perpetual roses, 5081a.
Perrault, Charles, 780d, 3971c, 4588d.
Perrot, Nicholas, 6336a.
Perry, Bliss, 4589a.
Perry, Christopher, 4589b.
Perry, Matthew Calbraith, 3122d, 4589b.
Perry, Oliver Hazard, 4590a.
Perry centennial, 4590c.
Perryville, Battle of, 4590d.
Persecutions of the Jews, 3151a.
Persephone (Proserpina), 4843d.
Persepolis, Persia, 4591a.
Perseus, 3723a, 4591a.
Pershing, John Joseph, 4591c, 6306a.
Persia, 4592a.
Persian cat, 1221b.
Persian Gulf, 4596b.
Persian long dogs, 2625c.
Persian peach, 4538c.
Persian rite, 3466d.
Persian walnut, 6131a.
Persian Wars, 2606b, 4596c.
Persimmon, 4596d.
Persis, 4592d.
Persistence of vision, 3989a.
Person (grammar), 4294c, 4597a, 6057a.
Personal hygiene, 2891b.
Personal liberty, 4597c.
Personal liberty, Writ of, 2652b.
Personal names, 4057a.
Personal pronouns, 4837c.
Personal property, 1285d, 4598a.
Personification, 4598b.
Personnel of navy, 4096c.
Perspective, 4598c.
Perspiration, 4599a.
Perth, Australia, 4599c.
Perth, Ont., 4599c.
Perth Amboy, N. J., 4599d.
Pertinax, 5320c.
Perturbations, 4600c.
Peru, 2936d, 4600b.
Peru, Ind., 4603d.
Peru, Marvel of, 2279b.
Perugino, 4604a.
Peruvian bark, 4604a.
Peruvian cotton, 1604c.
Peruvian current, 4334c.
Pescennius Niger, 5320c.
Peseta, 4604b.
Peshkov, Alexis Maximovitch, 2540b.
Peso, 4604b.
Pessimism, 4604c.
Pest, Hungary, 976c.
Pestalozzi, Johann Heinrich, 4604d.
Pétain, General Henri Philippe, 4605d.
Petals, 2223d.
Petchersk, 3238b.
Peten, Lake, 2632c.
Peter (disciple), 4606b.
Peter I, Alexeyevitch (Russia), 4607c.
Peter I (Serbia), 4607c.
Peterborough, Ont., 4607d.
Peterborough lock, 5873d.
Peters, Rev. Samuel, 782c.
Petersburg, Siege of, 4608a.
Petersburg, Va., 4608b.
Peter's pence, 4609a, 4757b.
Peter the Great, 4606b, 5055b.
Peter the Hermit, 1228c, 4609a.
Petigrain, 4486c.
Petiole of leaf, 3363a.
Petit Bois Island, 3844b.
Petitcodiac River, 3884d.
Petite Anse Island, 3516c.
Petition, 4609b.
Petition of Right, 4609c.
Petit jury, 3192b.
Petit larceny, 3333d.
Petit mal, 2064b.
Petit Trianon, 3651a, 6071d.
Petrarch, Francesco, 4610a.
Petrel, 4610c.
Petrie, William Matthew Flinders, 4611c.
Petrified forest of Arizona, 355c.
Petrograd, Russia, 4611b.
Petrolea, Ont., 4613d.
Petroleum, 4614a.
Petroleum fields of the United States, 5956d.
Petroleum jelly, 6038d.
Petroleum naphtha, 4060c.
Petropavlovsk, Kamchatka, 3200d.
Petty jury, 3192b.
Petunia, 4616a.
Pewee, 4643c.
Pewit, 4643c.
Pewter, 4616c.
Pezuello, 4603b.
Pfennig, 1668d, 4574a.
Phaedra, 4616c.
Phaethon, 4616d.
*Phaethon, Story of*, 4047d.
Phalanges, 2253a, 2681a, 5399d.
Phalanx, 2989c, 4617a.

Phanerogamous plants, 4617a.
Phanerogams, 4617a.
Phanrany River, 263b.
Pharaoh, 4617b.
Pharaoh-Nechoh, 4108c.
Pharaoh's daughter, 3962c.
Pharisees, 4617c.
Pharmacist, 1865a.
*Pharmacopoeia*, 4617d.
Pharmacy, 4618a.
Pharos, Island of, 4618b.
Pharos of Alexandria, 3425c, 5318b.
Pharsalia, Battle of, 287b, 4750c.
Pharynx, 4618b.
Phasis River, 4618c.
Pheasant, 2628c, 4618c.
Pheasant's eye, 4068c.
Pheidippides, 3645a.
Phelps, Elizabeth Stuart, 6137d.
Phenacetin, 4619b.
Phenacetin, Antidote for, 282b.
Phenol, 1177d.
Phenomenal berry, 1001c.
Phi Beta Kappa, 4619d.
Phidias, 4620a.
Philadelphia, Pa., 4620b.
Philae, Island of, 4627b.
Philemon, 628c.
Philetas of Cos, 1890d.
Philip, the Apostle, 4627c.
Philip, the Evangelist, 4627c.
Philip (kings of France), 4628b-4629c.
Philip (kings of Spain), 4629c-4630c.
Philip II (Macedonia), 4627b.
Philip Augustus, 4628b.
Philippe (Duke of Orleans), 4414c.
Philippe (Orleans-Bourbon), 4414b.
Philippe Egalité, 4414c.
Philippi, Battle of, 477a.
Philippi, Church of, 4529c.
Philippi, Thrace, 4627d.
*Philippics*, 1377c, 1755a, 4628a.
Philippine Islanders' idol, 2916d.
Philippine Islanders' spear, 5486b.
Philippine Islands, 4630b.
Philippopolis, Battle of, 5128b.
Philistia, 4458b.
Philistines, 4638c.
Phillips, David Graham, 4638d.
Phillips, Wendell, 4639b.
Phillipsburg, N. J., 4639d.
Philoctetes, 2781a, 4499c.
Philology, 4640a.
Philomela, 4641b.
Philosopher's stone, 165d.
Philosophy, 4641b.
Phipps, Henry, 4688b.
Phlegethon, 5707c.
Phlox, 4642c.
Phocion, 4643a.
Phocis, 318a, 1579d.
Phoebe, 4643b.
Phoenicia, 4643c.
Phoenicians, 2423b.
Phoenix, 4645b.
Phoenix, Ariz., 4645c.
Phoenixville, Pa., 4645d.
Phonendoscope, 5550c.
Phonetics, 4646a.
Phonograph, 5690a.
Phorcys, 3723a.
Phormium, 2205b.
Phosphate rock, 4647a.
Phosphates, 4646d.
Phosphorescence, 4647a.
Phosphoric acid, 4647d.
Phosphoric oxide, 4648a.
Phosphorus, 4647d, 6054a.
Phosphorus, Antidote for, 282b.
Phossy jaw, 3694d, 4648a.
Photius, 2610b, 4648b.
Photo-engraving, 4648b.
Photograph, X-ray, 5048c.
Photographer's camera, 1080d.
Photograph paper, 4650a.
Photography, 4649a.
Photography of the moon, 3940d.
Photogravure, 4648c.
Photolithography, 3465a.
Photometer, 4651b.
Photometry, 4651a.
Photosphere, 5624b.
Phrenological charts, 4652a.
Phrenology, 4651c.
Phrygia, 4653a.
Phylloxera, 1406d, 2574a, 4653b.
Physical culture, 1071d, 4653c.
Physical defects of children, 1944c.
Physical development, Observations on, 3928c.
Physical education, 2657a.
Physical examinations, Analysis of, 3410a.
Physical geography, 2426c, 4656c.
Physical map, Africa, facing 80.
Physical map, Asia, facing 416.
Physical map, Europe, facing 2096.
Physical map, North America, facing 4256.
Physical map, South America, facing 5448.
Physical mineralogy, 3818a.
Physics, 4657b.
Physiognomy, 4658c.
Physiography, 2426c, 4659c.
Physiological chemistry, 1298b.
Physiological psychology, 4860d.
Physiology, 4659c.
*Pia mater*, 891c.
*Pianissimo*, 4021d.
Piano, 4660a.
*Piano* (tone), 4021d.
Piassaba palm, 4463a.
Piaster, 1468d, 4660c.
Piave River, 6166a.
Picabia, Francis, 1667b.
Picador, 994a.
Picaresque novel, 5472d.
Picasso, Paul, 1667b.
Pica type, 5930d.
Piccalilli, 4662a.
Piccolo, 4660d.
Pichincha, Mount, 1922a, 4904b.
Pickens, Andrew, 4660d.
Pickens, Francis Wilkinson, 4661a.
Pickerel, 4661b.
Pickering, John, 2935d.
Pickering's governor, 2547c.
Pickett, George Edward, 4661c.
Pickett's charge, 4661c.
Pickled pigs' feet, 4764a.
Pickles, 4661d.
*Pickwick Papers*, 4662b.
Pic Long Mountain, 2296d.
Pico de Aneto, 5473a.
Picric acid, 2115a, 4662d.
Picton, Ont., 4663a.
Picton, Sir Thomas, 4663a.
Pictou, N. S., 4663a.
Picts, 4663b.
Pictured Rocks, 5631a.
Picture-producing plants, 3987d.
*Pictures of Memory*, 1211c.
Picture study, 3321b.
Pidgin English, 1353a, 4663c.
Pieces of eight, 4660c.
Pied-billed duck, 2599d.
Piedmont, Italy, 4663d.
Piedmont region, 125a, 4663d, 5946c.
Pied wagtail, 6122d.
Pieplant, 5004a.
Pier, 4664a.
Pierce, Franklin, 2725d, 4664b.
Pierre, S. D., 4670c.
Pieve di Cadore, Italy, 1835a.
Pigeon, 4670d.
Pigeon berry, 4722d.
Pigeonblood rubies, 5100d.
Pigeon English, 1353a, 4663c.
Pigeon hawk, 2724a.
Pig iron, 3058c.
Pig iron, Output of, 3060b.
Pigment of the skin, 5400c.
Pigments, 1483a, 4446d.
Pig of the plains, 6184d.
Pigweed, 4671b.
Pika, 4671c.
Pike, 4584a, 4671d.
Pike, Zebulon Montgomery, 3826b, 4672a.
Pike perch, 4584a.
Pike's Peak, 4672c.
Pilaster, 4673a.
Pilate, Pontius, 4673b.
Pilchard, 4673c.
Pilcomayo River, 4673c.
Pile, 4673d.
Pileated woodpecker, 6352d.
Pilgrim Fathers, 4714a.
Pilgrim memorial tower, 5453d.
Pilgrims, 4673d.
*Pilgrims' Chorus*, 1363c.
Pilgrim shell, 5345a.
*Pilgrim's Progress*, 999c, 4303a.
Pillars of Hercules, 2781a.
Pillory, 4674b.
Pillow, Gideon J., 4737c.
Pillow process lace, 3290b.
Pilot bread, 908d.
Pilot fish, 4674d.
Pilot Knob, 4441c.
Pilot Mountain, 314c.
Pilot snake, 1574b.
Pilsen, Bohemia, 4675a.
Pima Indians, 4675b.
Pimento, 207d, 4675c.
Pin, 4675d.
Pina muslin, 4680a.
Pinching bug, 5521a.
Pinchot, Gifford, 1552c, 4676c.
Pincio Hill, 5064b.
Pinckney, Charles Cotesworth, 4676d.
Pindar, 4677a.
Pindus Mountains, 2603d.
Pine, 4677b.
Pineapple, facing 4680, 4679c.
Pine Barrens, 5456d.
Pine Bluff, Ark., 4680a.
Pineda, Alvarez de, 3520b.
Pine lizard, 3470d.
Pine marten, 3666d.
Pine Ridge, 4101d.
Pine Ridge Reservation, 5463b.
Pinero, Arthur Wing, 4680b.
Pines, Isle of, 3072b.
*Pines, The*, 4679b.
Pine-tree flag, 2194d.
Pine-tree shilling, 4680c.
Pine Tree State, 3599a.
Ping pong, 4680d.
Pink, 4681a.
Pinkerton, Allan, 4681b.
Pink lady's slipper, 3295b, 3869b.
Pin money, 4675d.
Pinna, 1898e.
Pinnated grouse, 2629a, 4805d.
Pinnately-compound leaf, 3361b.
Pin-pool, 4754b.
*Pinta*, The, 1502a.
Pintsch gas, 2402c.
Pinworms, 6360a.
Pipe, Tobacco, 4681b.
Pipe clay, 1411b.
Pipefish, 4681d.
Pipe of peace, 1073d.
*Piper cubeba*, 1662b.
Pipe tobacco, 5825b.
Pipit, 4682a.
Pippin, 4578c.
Piqua, O., 4682a.
Piquet, 4682b.
Piracy, 4682d.
Piraeus, 455b, 4682c.
Pirates, 4682d.
Pirene, Fountain of, 4550c.
Pisa, Council of, 4683c.
Pisa, Italy, 4683a.
Pisano, Andrea, 5275a.
Pisano, Nicola, 5275a.
Piscataqua River, 4156c.
Pisces, the Fishes, 4683c.
Pisciculture, 2186b.
Pisidia, 4653a.
Pisistratus, 4683d.
Pissevache Falls, 5659d.

Pistachio, 4684a.
Pistacia, 4684b.
Pistil, 2224a.
Pitcairn Island, 4684b.
Pitch, 4679a, 5701a.
Pitch (in music), 4022a.
Pitchblende, 4913a.
Pitcher plant, color plate, facing 2224; 858a, 4684c.
"Pitchfork Ben," 5813b.
Pitch Lake, 5880b.
Pitch pine, 4677b.
Pitch roof, 5067c.
Pitman, Benn, 4684d, 5358d.
Pitman, Sir Isaac, 4684d, 5358c.
Pitmanic shorthand, 5339c.
Pitt, Mount, 4403b.
Pitt, William (1708-1778), 4685a.
Pitt, William (1759-1806), 4686a.
Pittacus, 5318d.
Pitt diamond, 1786b.
Pitti Palace, 4687a.
Pitt River, 5137c.
Pittsburg, Kan., 4687c.
Pittsburgh, Pa., 4687b.
"Pittsburgh of the South," 749c.
Pittsburg Landing, Battle of, 5352c.
Pittsfield, Mass., 4690b.
Pittston, Pa., 4690d.
Pit viper, 6089d.
Pius (Popes), 4691a-4692c.
Pivot joints, 3167b.
Pizarro, Francisco, 3432d, 4602a, 4692c.
Place de la Concorde, 4495b.
Place de l' Etoile, 4495c.
Place du Carrousel, 5276b.
Placer mines, 2524b.
Place value, 6228c.
Place Vendôme, 4495c.
Plague, 4693c.
Plain, 4694a.
Plainfield, N. J., 4694c.
*Plain Language from Truthful James*, 2706d.
Plains Indians, 2963b.
Plains of Abraham, 4896c.
Plaintiff, 4831a.
Plaited skirt, 5327c.
Planchets, 1467b.
Plane, 4694d.
Plane mirrors, 3841b.
Plane of the ecliptic, 1916b.
Planes of cleavage, 1414c.
Planet, 4695a.
Planetary dust, 1887c.
Planetesimal hypothesis, 1901d, 2437a, 4108c.
Planetoid, 440c, 435b, 4696b.
Plane tree, 4696c.
Plane trigonometry, 5879b.
Planing machine, 4696d.
Plant, 4697a.
Plant, Morton F., 4699c.
Plantagenet, 4699d.
Plantain, 4699d.
Plant breeding, 914b.
Plant geography, 2426d.
Plant industry, Bureau of, 106b.
Planting-table for flowers, 2226a.
Planting time for vegetables, 6043a.
Plant lice, 291b, 4653b.
Plant life, Studies in, 4088b.
Plant life in Canada, 1100b.
Plant life of the ocean, 4333a.
Plants, Diseases of, 1806a.
Plasma, 775a.
Plassey, Battle of, 2590d.
Plastering, 4700b.
Plaster of Paris, 4701a.
Plastron, 5920a.
Plata, Rio de la, 4701b.
Plataea, 5783a.
Plataea, Battle of, 2606c, 4596c.
Plateau, 4701b.
Plateau Indians, 2963d.
Plate-divider, 1354b.
Plate-edge planer, 4696d.
Plate glass, 2508d.
Platen, 3998c, 5930c.
Platen machine, 4825c.
Platform scale, 6240c.
Platinum, 4701d, 5115d.
Plato, 4702c.
Platoon, 380b.
Platt, Thomas Collier, 1543d, 4703b.
Platt Amendment, 5945c.
Plattdeutsch, 4703c.
Platten See, 501c.
Platte River, 4704a.
Platt National Park, 4505b.
Plattsburg, N. Y., 4704a.
Plattsburg Barracks, 4704b.
Platypus, 1874a.
Plautius Lateranus, 3339b.
Plautus, Titus Maccius, 4704c.
Play, 4705a.
Player piano, 4660b.
"Playground of Europe," 5659a.
*Playing Train* (game), 2374d.
Play material for children, 3252b.
Plaza, Don Nicanor, 1338a.
Plaza, Victorino del, 342b.
Pleadings, 4831a.
Plebeians, 4526b, 4706b, 5057d.
*Plecoptera*, 3001a.
Plehve, Viatscheslaf Konstantinovich, 4706c.
Pleiades, 446c, 4706d.
Pleione, 4707a.
Pleistocene Period, 2441d.
Plenary indulgence, 2974a.
Plenipotentiaries, 222b.
Plenum system, 2753a.
Pleura, 3537c, 3727b, 4707a.
Pleurisy, 3537c, 4707b.
Plevna, Siege of, 5128b.
Plexus, 4121b.
Pliny the Elder, 4707c.
Pliny the Younger, 4707d.
Pliocene Period, 4808a.
Plotz, Dr. Harry, 5932d.
Plover, 4708b.
Plow, 4708d.
*Plowing in the Nivernais*, 4452.
Plug and feather method, 4885b.
Plum, 4709d, 4852b.
Plumb, 4711c.
Plumbago, 2575b.
Plumbing, 4710c.
Plumb-line, 3392a.
Plumbline port to Panama, 1278d.
Plumcot, 1001c.
"Plumed Knight," 762d.
Plummet, 4711c, 5446b.
Plumule, 1611b, 2482d.
Plurals, how formed, 4310a.
Plush, 4711d, 6046c.
Plutarch, 4711d.
Pluto, 4045a, 4712a, 4843d.
Plutocrat, 4712c.
Plutus, 4712a.
Plymouth, Eng., 4712c.
Plymouth, Mass., 4712d.
Plymouth, Pa., 4713b.
Plymouth Colony, 4713d.
Plymouth Company, 4714d.
*Plymouth Plantation, History of*, 887d.
Plymouth Rock, 4713b, 4715a.
Pneumatic dispatch, 4716b.
Pneumatics, 4715a.
Pneumatic tires, 4715b.
Pneumatic tools, 4716a.
Pneumatic tubes, 4716b.
Pneumogastric nerve, 4121a.
Pneumonia, 4716d.
Poaching, 2372d, 5876a.
Pocahontas, 4717c.
Pocatello, Ida., 4717d.
Pocket flower, 5407d.
Pocket veto, 6075a.
Poco a poco, 4026a.
Pod corn, 1585b.
Podol, 3238a.
Poe, Edgar Allan, 4718a.
Poe cottage, 4718r.
Poe lock, 5222d.
Poetic literature, 3458c.
Poet laureate, 926c, 4719b.
"Poet of the Commonplace," 3497c.
"Poet of the Lakes," 1088a.
"Poet-painter of England," 6225c.
Poetry, 4719c.
Poets' Corner, 4720d.
"Poet's darling," 1690b.
"Poet's flower of spring," 1619d.
Poet's narcissus, 4068c.
Pogy, 3733a.
Poi, 2718b.
Poincaré, Raymond, 4721a.
Poinsettia, 4721b.
Point, in type, 5930d.
Point Barrow, Alaska, 135b.
Point d'Angleterre lace, 3290b.
Pointe-a-Pitre, W. I., 2630a.
Pointer, 4721b.
Point Levis, 4897a.
Point Loma, Cal., 5188a.
Point of order, 4510c.
Point Venus, Tahiti, 5427b.
Poison, 4721c.
Poison drugs, 3415b.
Poison ivy, 3090d.
Poison ivy, Antidote for, 282b.
Poison nut, 4320b.
Poisonous mushrooms, 4016a.
Poisonous plants, 4722a.
Poison sumac, 5622a.
Poisson, Jeanne Antoinette, 4748b.
Poitiers, France, 4722b.
Pokeweed, 4722c.
Poland, 4722d.
Polar bear, 636b.
Polar exploration, 4725b.
Polariscope, 4730c.
Polarization, 1981c.
Polarization of light, 4730d.
Polders, 666d, 4124b.
Pole, 4731c.
Polecat, 4731d.
Polemarch, 329d.
Pole rabbit, 4907a.
Poles of the horizon, 4731c.
Polestar, 4277c, 4731c, 4732a.
Pole vault, 4732a.
Police, 4732b.
Polish accent, 4840d.
Polish Succession, War of the, 5610a.
Polish wheat, 6262b.
Political clubs for women, 6349c.
Political demands of Socialism, 5425d.
Political economy, 1917a.
Political geography, 2428d.
Political map, Africa, facing 81.
Political map, Alaska, facing 135.
Political map, Asia, facing 417.
Political map, Australia, facing 488.
Political map, Canada, facing 1096.
Political map, Europe, facing 2092.
Political map, Mexico, facing 3768.
Political map, North America, facing 4257.
Political map, South America, facing 5449.
Political map, United States, facing 5944.
Political parties in Canada, 4735b.
Political parties in the United States, 4733a.
Political treaties, 5868a.
Polk, James Knox, 4736b, 5736d.
Polk, Leonidas, 4742b.
Polk, Samuel, 4737a.
Polka, 1697b.
Pollen, 2224a, 4742c.
Pollination, 1647a, 4742c.
Pollio, Asinius, 6061a.
Poll tax, 4743c, 5712b.
Pollux, 1219b.

Pollywogs, 2341d.
Polo, 4744a.
Polo, Marco, 4744b.
Poltava, Battle of, 4607a.
Polyandry, 4745a.
Polyanthus narcissus, 4068d.
Polybius, 4744d.
Polybus, 4344b.
Polycletus, 5274a.
Polycotyledonous plants, 5291b.
Polycotyledons, 1611c.
Polycrates, 4744d.
Polygamy, 4745a.
Polygon, 4745c.
Polyhymnia, 4012b.
Polynesia, map, facing 4336b; 4746a.
Polynices, 283c, 4344b.
Polyphemus, 4746c.
Polyps, 1576d, 3723b, 4746b.
Polytechnic schools, 5247b, 3637b.
Polytheism, 4746d.
Polytheistic religions, 4965c.
Polyxena, 4499c.
Pomato, 1001d.
Pomegranate, 4747a.
Pomegranate-red rubies, 5101a.
Pomelo, 2575a.
Pomerania, 4747c.
Pomeranian dog, 5503a.
Pomology, 2844b.
Pomona, 4747d.
Pomona, Cal., 4748a.
Pompadour, Jeanne Antoinette Poisson, 4748b.
Pompano, 4748c.
Pompeii, Italy, 4748d.
Pompey, 1042b, 4750a.
Ponca Indians, 4750d.
Ponce, Porto Rico, 4773b.
Ponce de Leon, Juan, 4751a.
Pondicherry, India, 4751b.
Pond lily, 6216b.
Pone, 908d.
Poniatowski, 4724c.
*Pons*, 892b.
*Pons asinorum*, 2446c.
*Pons varioli*, 891d.
Pontchartrain, Lake, 4751c.
Pont du Gard, 306d.
Pontiac, 4751c.
Pontiac, Mich., 4752a.
Pontifex, 4752b.
Pontifex maximus, 4752b.
Pontius Pilate, 3146c.
Pontoon bridges, 923c, 4752c.
Pontus, 4753a.
Pony engine plow, 4709a.
Pony express, 1067c.
Poodle, 4753b.
Pool (business), 5891b.
Pool (game), 4753b.
Poona, India, 4754c.
Poopo, Lake, 250a.
Poor Clares, 2310a.
Poor laws, 4754d.
Poor man's cow, 2517c.
"Poor priests," 6366d.
*Poor Richard's Almanac*, 209a, 2315b, 4755a.
Poorten-Schwartz, J. M. W. van, 3548a.
Popcorn, 1585b.
Pope, 4755b.
Pope, Alexander, 2063d, 4758b.
Pope, Sir Joseph, 4759a.
Poplar, 4759b.
Poplin, 4759d.
Popocatepetl, Mount, 4760a.
Poppy, 3719a, 4760b.
Poppy family, 857c.
Popular government, 2546d.
Popular names of states, 5973a.
Popular sovereignty, 5516d.
Popular vote for President, 4811d.
Population, 4760d.
Population, Canada, 1093b.
Population, Center of (United States), 5972a.
Population according to race, 4910a.
Population map, Africa, facing 80.
Population map, Asia, facing 416.
Population map, Europe, facing 2096.
Population map, North America, facing 4256.
Population map, South America, facing 5448.
Populist party, 4762a.
Poquelin, Jean Baptiste, 3878d.
Porcelain, 4762c, 4798a.
Porcelain clay, 1411b.
Porcupine, 4763a.
Porcupine, Ont., 4763c.
Porcupine ant-eater, 277d.
Porcupine Forest Reserve, 3628b.
Porcupine Mountains, 3782b.
Porifera, 5505d.
Pork, 4763d.
Pork-packing industry, 4764c.
Pororoca, 221c.
Porosity, 4764d.
Porphyritic gneiss, 2517a.
Porphyry, 4764d.
Porpoise, 4765a.
Po River, 4717b.
Porta, Della, 5540a.
Portable kiln, 1354d.
Portage Falls, 2416b.
Portage Lake and Lake Superior Canal, 1147b.
Portage La Prairie, Man., 4765b.
Portal circulation, 1388a.
Portal vein, facing 1388.
Port Antonio, Jamaica, 4765c.
Port Arthur, Manchuria, 4765d.
Port Arthur, Ont., 4766a.
Port Arthur, Siege of, 4244c, 5127a.
Port Arthur Canal, 1147b.
Port-au-Prince, Haiti, 4766c.
Port Chester, N. Y., 4766d.
Port Colborne, Ont., 4767a.
Portcullis, 1218d.
Port Darwin, Australia, 4275a.
Port Elizabeth, South Africa, 4767b.
Porter (wine), 659a.
Porter, David, 3658d, 4767c.
Porter, David Dixon, 4768a.
Porter, Gene Stratton, 4768c.
Porter, Jane, 4769a.
Porter, Noah, 6380d.
Porter, William Sydney, 4769b.
Porter's governor, 2547c.
Port Gamble, Wash., 6193b.
Port Hope, Ont., 4769d.
Porthouse, Thomas, 3450a.
Port Huron, Mich., 4769d.
Port Ibrahim, Egypt, 5613c.
Port Jervis, N. Y., 4770b.
Portland, Me., 4770c.
Portland, Ore., 4771c.
Portland cement, 1248d, 1911b.
Port Mahon, Minorca, 3836b.
Port Melbourne, Australia, 3725a.
Port Nelson, Man., 2859c, 2860a, 4115b.
Porto Alegre, Brazil, 4772b.
Port of Cale, Portugal, 4779b.
Port of entry, 4772c.
Port of Spain, Trinidad, 4772d.
Portola, Don Gaspar de, 5193b.
Porto Novo, Dahomey, 1687d.
Porto Rico, 4773a.
Port Phillip Bay, 6078b.
*Portrait Madonna*, 3585d.
Port Royal, Acadia, 264a.
Port Royal, Jamaica, 3106c.
Port Said, Egypt, 4777b.
Portsmouth, England, 4777b.
Portsmouth, N. H., 4777d.
Portsmouth, O., 4778b.
Portsmouth, Treaty of, 4766a, 5127c.
Portsmouth, Va., 4778c.
Ports of the world, 1511d.
Portugal, 4779a.
Portugal, Flag of, 2199b.
Portugal laurel, 3344b.
Portuguese East Africa, 4785b.
Portuguese Guinea, 4785c.
Port wine, 4786a.
Posen, Germany, 4786b.
Position assumed in writing, 4561a.
Positive (photography), 4650a.
Positive charge, 1985a.
Positive degree, 1519c.
Positive electrode, 1981b.
Positive eugenics, 2090d.
Positive of moving picture film, 3991a.
Positivism, 1523c.
Possessive case, 1213d, 4295a.
Postage and postage stamps, 4786d.
Postage due stamps, 4787d.
Postage stamps, 4787d.
Postal savings bank, 5225d.
Potal service of—
Canada, 4792c.
France, 4790b.
Germany, 4790a.
Great Britain, 4790a.
United States, 4790b.
Postal Union, International, 4789a
Postal Union monument, 4789c.
Post exchange, 1161b.
Postimpressionists, 2936d.
Postoffice Department, 4789b.
Postoffice order, 3888c.
Post offices, Classes of, 4792a.
Postulates, 2445c.
Postumus Agrippa, 5805d.
*Posture* (game), 2376b.
Potash, 4792d.
Potash alum, 217c.
Potash feldspar, 2150b.
Potassium, 4793a.
Potassium bichromate, 1371c.
Potassium bitartrate, 1628a.
Potassium cyanide, 4793b.
Potassium nitrate, 5178c.
Potassium plaster, 4793b.
Potato, 4793b.
Potato bug, 4795b.
Potato-bug bird, 2626d.
Potato clubs, 4795a.
Potato starch, 5530d
Potawatomi Indians, 4795c.
Potential energy, 2032a.
Potential mode, 3870c.
Potiphar, 3174a.
*Pot of Basil*, 4452.
Potomac River, 4795d.
Potsdam, Prussia, 4796a.
Potsdam quartzite, 5189a.
Pottage, 3380d.
Potter, Paul, 4454b.
Potter's clay, 1411b.
Potter's ore, 2362a.
Potter's stone, 133d.
Potter's wheel, 4796c.
Pottery, 1910d, 4796b.
Pottstown, Pa., 4798c.
Pottsville, Pa., 4798d.
Pouched bear, 3273c.
Pouched dog, 5709b.
Poughkeepsie, N. Y., 4799a.
Poultry, 4799b.
Poultry foods, 4801c.
Pound, 3760d, 4802c.
Poundage, 5703b.
Pounding drill, 6242c.
Pound sterling, 4802c.
Poussin, Nicolas, 4802c.
Poutrincourt, Jean de Biencourt, Baron de, 3938b, 4802d.
Powder-down tracts, 2784b.
Powderly, Terence Vincent, 4803a.
Powdery mildew, 3796b.
Powell, John Wesley, 2432d, 4803a.
Powell, Mary, 3810c.
Powell, Maud, 4803b.
Powell, Mount, 3904c.
Powell, Richard Stillman, 590b.
Powell, William, 4418c.
Powell, William H., 1506a.

Power (mathematics), 3030a, 4803c.
Power loom, 6234b.
Power of attorney, 4803d.
Power printing press, 4825c.
Powers, Hiram, 4804a, 5277a.
Powers, The Great, 4804b.
Powers and privileges of the President, 4813a.
Powers of the Supreme Court, 5639a.
Powhatan, 4804b.
Poynings, Sir Edward, 3050d.
Poznan, 4786b.
Pozsony, Hungary, 4814a.
Practical clubs for women, 6349b.
Practice teaching, 5246a.
Praetor, 4804c.
Praetorian Guard, 4804d.
Pragmatic Sanction, 3650b, 4805a.
Prague, Bohemia, 4805a.
Prairie, 4805c.
Prairie chicken, 2629a, 4805d.
Prairie dog, 4805d.
Prairie itch, 3087a.
Prairie "schooners," 1067a.
Prairie squirrel, 2536d.
Prairie State, 2920b.
Prairie wolf, 6343d.
Praise-God Barebone, 590d.
Praseodymium, 1295a.
Pratt, Captain R. H., 5999a.
Praxiteles, 4806b.
*Prayer in the Desert,* facing 1774.
Prayer rug, 1199c.
Praying horse, 4845c.
Praying mantis, 3637c.
Preacher bird, 6090d.
Preaching Friars, 1839b.
Preceptorial system, 6302b.
Precession of the equinoxes, 4806c.
Precious coral, 1577b.
Precious opal, 4388c.
Precious stones, 2412d.
Predestination, 4806d.
Predicate, 5303c.
Pre-dreadnaught, 4096c, 6181a.
Preëmption, 2824c, 4807a.
Preëmption, in international law, 4807b.
Prefect, 1771c, 2300c.
Preliminary injunctions, 2994d.
Premier, 4807c.
Premier, British, 2587d.
Premier, Canadian, 1115d.
Premium (insurance), 3004d.
Preposition, 4807d.
Pre-Raphaelites, 4809c.
Presbyterian Church, 4807a.
Presbyterians, 4809d.
Presbytery, 4809d.
Prescott, Ariz., 4810c.
Prescott, Ont., 4810b.
Prescott, William Hickling, 4810d.
Prescription, 6085b.
Present participle, 4517c.
Present perfect tense, 5757c.
Present tense, 5757b.
Preservation of food products, 2247b.
Preservatives, 61d.
Preserves, How to make, 2250b.
*Presidentes,* 6049b.
Presidential electors, 1979a, 4811c.
Presidential Range, 4155d, 6274d.
Presidential Succession Act, 1421a, 4813b.
President of the Council (Canada), 1115b.
President of the United States, 4811b, 5974d.
President's Cabinet, 1034c.
Presidio, 5191a.
Press, Liberty of the, 4813c.
Pressburg, Hungary, 4813d.
Pressure turbine, 5904d.
Preston, Eng., 4814a.
Preston, Ont., 4814b.
Prestwick, Scotland, 521d.
Pretoria, South Africa, 4814c.
Pretorius, Andries, 4814d.
Preussen, 4853a.
Prevailing westerlies, 4814d.
Preventive dentistry in schools, 1768d.
Preventive injunction, 2994d.
Preventive inoculation, 2997a.
Preventive therapeutics, 5785b.
Prevost, Sir George, 4815a.
Prevost's theory of exchanges, 2749d.
Priam, 2757c, 4815b.
Pribilof Islands, 4815c, 5282c.
Price, 6025a.
Price, Sterling, 4815d.
Price of money, 3886a.
Prickly ash, 4816a.
Prickly pear, 1039c, 4816b.
Prickly poppy, 4760d.
Prickly spinach, 5499b.
"Pride's Purge," 5107a.
Priest, 4816c, 5052d.
Priesthood in the Roman Catholic Church, 5052d.
*Priestly Code,* 4576b.
Primary anaemia, 243b.
Primary batteries, 1981d.
Primary colors, 1483c.
Primary election, 4734b, 4816c.
Primary rainbow, 4923b.
Primary roots, 5078c.
Primates, 2441d, 3617c, 4817a.
Prime, 2151c.
Prime meridian, 3746d.
Prime meridian conference, 5524a.
Prime number, 2124a.
Primitive plow, 4709a.
Primogeniture, 4817a.
Primrose, 4817b.
Primrose and West minstrels, 3837c.
Primrose day, 1808b.
Primus berry, 1001c.
Prince, 4817c.
Prince Albert, Sask., 4817d.
Prince Charles Foreland, 5503b.
Prince Consort, 152a.
Prince Edward Island, 4818b.
Prince Eugene of Savoy, 2089c.
Prince George, B. C., 4821b.
"Prince of American letters," 973a.
"Prince of Italian painting," 4930c.
Prince of Wales, 4821c.
Prince of Wales (Alaskan island), 135d.
Prince of Wales Island (Straits Settlements), 4557b.
Prince Rupert, B. C., 4821d.
Princess Royal Islands, 4280a.
Princeton, Battle of, 4822a.
Princeton, N. J., 4822c.
Princeton University, 4822c.
Principal (law), 91a, 2631c.
Principal motion, 4510a.
Principal verbs, 6056c.
Printing, 4823b.
Printing (photography), 4650a.
Printing ink, 2995b.
Printing press, 4824d.
Printing telegraph, 5735d.
Prism, 4826d.
Prismatic Lake, 6389d.
Prismatic systems of crystallization, 1654d.
Prison, 4827b.
*Prisoner of Chillon,* 1339b.
Prisoners of war, 4829a.
Prison reform, 4828b.
Private corporation, 1595b.
Privateer, 4829c.
Private exchange (telephone), 5741c.
Private law, 3349d.
Private nuisance, 4309a.
Privileged question, 4510b.
Privy Council, 4829d.
Privy seal, 4830a.
Prix de Rome, 1916c.
Prize fighting, 4830b.
Probate, 4830d.
Probation system, 1639b, 3449c.
Proboscis monkey, 3891d.
Procedure, 4831a.
Procne, 4641b.
Procopius, 6019d.
Procter, Adelaide Anne, 4831c.
Proctor, [Alexander] Phimister, 4831c.
Proctor, Mary, 4831d.
Proctor, Richard Anthony, 4832a.
Procurator, 4673b.
Productive consumption, 1562c.
Productivity theory of interest, 3011d.
Professional athletics, 457a.
Professional clubs for women, 6349c.
Profession of law, 3351a.
Profile Mountain, 4155d, 6275a.
Profit, 4832b.
Profit sharing, 4832c.
Program for—
Arbor day, 316a.
Boys' and girls' clubs, 880d, 881, 882.
Christmas, 1369a.
Columbus day, 1504a.
Decoration day, 1737a.
Dickens' birthday, 1791c.
Easter, 1908c.
Empire day, 2027c.
Flag day, 2196c.
Hallowe'en, 2671c.
Independence day, 2941a.
Lanier's birthday, 3328a.
Lee's birthday, 3369a.
Lincoln's birthday, 3445c.
Longfellow's birthday, 3497a.
Thanksgiving, 5780a.
Washington's birthday, 6206a.
Progreso, Yucatan, 5395b.
*Progress and Poverty,* 5391a.
Progressive party, 4832d, 5686b.
Progressive whist, 6269c.
Prohibition, 965a, 4833b.
Prohibition in Canada, 4835a.
Prohibition in Europe, 4835b.
Prohibition in the United States, 4833c.
Prohibition party, 4833c, 4835d.
Projectile, 4836b.
Projecting machine (moving pictures), 3991d.
Projective geometry, 2444d.
Prolate spheroid, 5495c.
Prometheus, 4043b, 4836c.
Promissory note, 4292a.
Pronators, 373a.
Pronghorn, 278a, 1234c, 4836d.
Pronoun, 4837a.
Pronouns, Person in, 4597a.
Pronunciation of foreign names, 4840b.
Proper nouns, 4294a.
Properties of matter, 3698d.
Prophet, 4842d.
Prophet, The, 5728a.
Prophets, The, 3149d.
Propolis, 650d.
Propontis, 3657b.
Proportion, 4843a.
Proposition, 2445a.
Propylaea, 454b.
Proscenium, 5782a.
Prose, 4843b.
*Prose Edda,* 5421b.
Prose literature, 3458d.
Proserpina, 4045a, 4843d.
Prospecting (mining), 3821c.
Protection, 4844a.
Protection against crime, 1638d.
Protection of birds, 735d, 742a.
Protective coloration, 4845b.
Protective tariff, 4977d.
Protectorate, 4845d.
Proteids, 4846b.
Protein diet, 2741b.
Proteins, 2242d, 3413a, 4846b.
Pro tempore, 5301a.

Proterozoic Era, 2438b, 4846b.
Protesilaus, 4846c.
Protest, 4292c.
Protestant, 4846d.
Protestant Episcopal Church, 2064d.
Proteus, 4847b.
Protoplasm, 1247a, 4847c.
Protozoa, 4847d.
Proudhon, Pierre Joseph, 4848b.
Provençal language and literature, 4848c.
Proverb, 4848d.
*Proverbs*, Book of, 4849a.
Providence, R. I., 4849c.
Providence Plantation, 4999b.
Providence River, 4997b.
Province, 4850b.
Province of Maine, 4159b.
Provincial government in Canada, 1119a.
Provision State, 1548c.
Provo, Utah, 4851c.
Provo River, 6011c.
Proximate analysis, 244d.
Proxy, 4851d.
Prudence Island, 4069c, 4997b.
Prune, 4852b.
Pruning, 4852d.
Prussia, 4853a.
Prussic acid, 4856a.
Prussic acid, Antidote for, 282b.
Prynne, Hester, 5231c.
Prytaneum, 4372a.
Przewalski's horse, 2839d.
*Psalms*, 1710a, 4719d, 4856b.
Pseudopodia, 238c.
Pseudo-sciences, 5253d.
Psyche, 4856c.
Psychical research, 4857b.
Psychic inferiority, 3739b.
Psycho-analysis, 4859c.
Psychological observations, Guide for, 3928a.
Psychology, 4860b.
Ptarmigan, 4861c.
Pteridophytes, 862a, 4861c.
Pterodactyl, 4861d.
Pterylae, 2144c.
Ptolemaic system, 4862d.
Ptolemy (astronomer), 440a, 4862d.
Ptolemy (kings of Egypt), 4862a.
Ptolemy Epiphanes, 4862c.
Ptolemy Euergetes, 4862c.
Ptolemy Philadelphus, 4862b.
Ptolemy Soter, 179d, 4862a.
Ptomaine poisoning, 4683b.
Ptomaines, 202c, 4863a.
Ptyalin, 4579b.
Pubes, 5399b.
Public accountant, 21b.
Public baths, 623a.
Public corporation, 1595b.
Public credit, 1629b.
Public defender, 4863b.
Public games, 2378b.
Public hygiene, 2892a.
Publicity advertising, 68c.
*Publick Occurrences, Both Foreign and Domestick*, 4187a.
Public lands, 3307d.
Public law, 3349d.
Public nuisance, 4309a.
Public schools, 5237a.
Public utilities commission, 3632a.
Publishing, 830d.
"Publius," 2148a.
Publius Licinius Valerianus, 6021b.
Publius Ovidius Naso, 4432d.
Publius Terentius Afer, 5760b.
Publius Vergilius Maro, 6060d.
Puccini, Giacomo, 4863c.
Puck, 4863d.
Pudding stone, 1534a.
Puebla, Mexico, 4863d.
Pueblo, Colo., 4864d.
Pueblo Indians, 4864b.
Pueblo of the Hopi, 2832c.
Puerta Cabello, Venezuela, 6048a.
Puerta Plata, Santo Domingo, 5201b.
Puerto Bello, Panama, 4467d.
Puerto Principe, Cuba, 1075d.
Puerto Viejo, Porto Rico, 4776c.
Puff adder, 40b.
Puffball, 2350a, 4865c.
Puffball mushroom, 4014c.
Puffin, 4865c.
Pug, 4865d.
Puget, Pierre, 5276a.
Puget Sound, 4865d.
Puget Sound ship canal, 5285b.
Pugsley, William, 4866b.
Puisne judge, 1118d, 4866b.
Pulaski, Casimir, 4866c.
Pulaski's Legion, 4866d.
Pulcheria, 1031c.
Pulitzer, Joseph, 4866d.
Pulled wool, 6354c.
Pulley, 773c, 3714c, 4867b.
Pullman, George Mortimer, 4867d.
Pullman strike of 1894, 4372a.
Pulmonary artery, facing 1388.
Pulmonary circulation, 1388a.
Pulmonary pleura, 4707a.
Pulmonary tuberculosis, 5895d.
Pulmonary vein, facing 1388.
Pulmotor, 4868a.
Pulp cavity of tooth, 5728c.
Pulpit Rock, 266d.
Pulque, 4868b.
Pulse, The, 4868c.
Pulse family, 855a, 857b, 3373c.
Pulsey, 4875a.
Pultowa, Battle of, 1278a, 2167d.
Puma, 1220a, 4868d.
Pumice, 4869a.
Pump, 4869a.
Pump gun, 5362a.
Pumpkin, 4870a.
Pumpkin seed (fish), 5629c.
Punch Bowl Falls, 4506c.
Punctuation, 4870c, 5303c.
Punda, 4908a.
Punic Wars, 4872b.
Punjab, 4872b.
Punky, 2516d.
Punt (boat), 5143d.
Punt (football), 2257a.
Punta Arenas, Chile, 4872d.
Punxsutawney, Pa., 4873b.
Pupa, 1023d, 1372c, 3752b, 4873c.
Purcell, Henry, 4389c.
Purcell Range, 5297d.
Purdue University, 4873c.
Pure food laws, 61a.
Pure mathematics, 3696c.
Pure rent, 5391d.
Purgatory, 4873d.
*Puritan, The* (statue), 4874b.
Puritan Age in literature, 2056b.
Puritans, 4873d.
Purmont, Philemon, 5237b.
Purple, 4874d.
Purple City, 4551d.
Purple flag, 3054d.
Purple grackle, 1649a.
Purple martin, 3667d.
Purple wampum, 6133d.
Purposes of story-telling, 5564b.
Purpura murex, 4874d.
Purslane, 4875a.
Pursley, 4875a.
Purulent gastritis, 2406b.
Pusan, Chosen, 1364b.
Put-in-Bay, O., 2070b, 4584a.
Put-in-Bay Island, 4590c.
Putnam, Israel, 4875b.
Putnam, Rufus, 4355c.
Putrefaction, 4875c.
Putrefactive organisms, 1736d.
Putrid Sea, 522d.
Putting the shot, 5361d.
Putty, 4875d.
Puyallus River, 5676b.
Pu-yi, 1352b.
Puysegur, Marquis de, 2897c.
Pygmalion, 4875d.
Pygmies, 4876a.
Pygmy hippopotamus, 2800a.
Pygmy parrot, 4514a.
Pylades, 4411a.
Pyle, Howard, 4876b.
Pyloric orifice, 5558c.
Pylorus, 7c, 201c.
Pym, John, 4876c.
Pyorrhoea, 5730a.
Pyramid, 4876d.
Pyramid, Mount, 4506c.
Pyramid Lake, 4134c, 4506c, 5687c.
Pyramid pool, 4753c.
Pyramids, 4878a.
Pyramus and Thisbe, 4879b.
Pyrenees Mountains, 4879c.
Pyrite, 4879d.
Pyrites, 4879d.
Pyrope, 2394d.
Pyroxene, 4880a.
Pyroxylin, 1248a.
Pyrrha, 1779d, 4044a.
Pyrrhic victory, 4880b.
Pyrrhus, 4880a.
Pythagoras, 4880c.
Pythagorean brothers, 4880c.
Pythagorean theorem, 2443d, 2446d, 5876c.
Pythia, 1750d.
Pythian foot, 2252a.
Pythian games, 4880c.
Pythias, 1694c.
Pythias, Knights of, 4880d.
Pytho, 1750c.
Python (myth), 4881c.
Python (serpent), 487d, 4881a.
Pythras, 4726d.

# Q

Q, 4882a.
Q. E. D., 2445b.
Q. E. F., 2445c.
Qoph, 4882c.
Quack grass, 1611d.
Quadrant, 4882a.
Quadrant electrometer, 2002d.
Quadrilateral, 4882a.
Quadrille, 1697b, 4882d.
Quadroon, 3996a.
Quadruplex telegraph system, 5735b.
Quaestor, 4883a.
Quail, 4519b, 4619a, 4883b.
Quakers, or Society of Friends, 4562a, 4563d, 4883c.
Quaking aspen, 425c.
Qualitative analysis, 244c.
Quality of sound, 5445c.
Quality of tones, 4022a.
Quantitative analysis, 244c.
Quantity, 4884b.
Quapaw, 4884c.
Quarantine, 4884c.
Quarry and quarrying, 4885a.
Quart, 4886b.
Quarte, 2151c.
Quarterdeck, 4886b.
Quartering Act, 4985a.
Quartre Bras, Battle of, 4066d.
Quartz, 2563c, 2688b, 3817c, 4886c.
Quartzite, 2435b.
Quasi-War, 33c.
Quaternary Period, 4886d.
Quatsino Sound, 6032d.
Quawk, 4234d.
Quebec (province), 4887a.
Quebec, Battle of, 4896c.
Quebec, Que., 4894b.
Quebec Act, 1122c, 4897c.
Quebec bridge, 922d, 4898a.
Quebec Resolutions, 4898b.
Quebec Ter-Centenary, 4898c.
Queen, 4898d.
Queen Anne's War, 2329d, 5609b.
Queen bee, 649c.
Queen Charlotte Islands, 4899a.
"Queen City of the Adriatic," 6051b.

"Queen City of the Plains," 1770a.
"Queen City of the West," 1382c.
*Queen Louise*, 4452.
"Queen of Andalusia," 5320d.
*Queen of Hearts, The*, 3319a.
"Queen of the Antilles," 3105b.
"Queen of the East," 6410d.
Queens, Borough of, 4205c.
Queensberry, John Sholto Douglas, 4899b.
Queensland, 4899b.
Queenston Heights, Battle of, 4900b.
Queenstown, Ireland, 4900c.
Queen's University, 4900d.
Queen's ware, 6237d.
Queen Victoria Niagara Falls Park, 4226a.
*Queer Little Baker Man, The*, 5574b.
Quelpaert Island, 1364b.
Quesada, Manuel, 1660d.
Questions on—
Abyssinia, 16b.
Adams, John, 32b.
Adams, John Quincy, 37b.
Advertising, 69b.
Afghanistan, 75d.
Africa, 86b.
Agriculture, 112b.
Alabama, 132a.
Alaska, 145a.
Albania, 148d.
Alberta, 162a.
Algebra, 197d.
Ant, The, 272b.
Apple, The, 299b.
Arabia, 310b.
Architecture, 328a.
Argentina, 340b.
Arizona, 361a.
Arkansas, 370a.
Army, The, 383b.
Arthur, Chester A., 397b.
Asia, 423a.
Assyria, 434b.
Astronomy, 447b.
Athens, 455d.
Athletics, 458d.
Atlantic Ocean, 462d.
Attention, 468b.
Australia, 492b.
Austria-Hungary, 509a.
Baby, The, 530b.
Babylonia, 534a.
Bacteria and bacteriology, 538d.
Balkan Wars, 555d.
Banks and banking, 583b.
Baseball, 609b.
Basket ball, 611b.
Basketry, 615d.
Bear, 636d.
Beaver, 642b.
Bees, 654b.
Beetle, 662a.
Belgium, 672b.
Berlin, 695b.
Bible, 709b.
Birds, 744b.
Bolivia, 799b.
Boston, 851b.
Botany, 863b.
Brazil, 904b.
British Columbia, 941a.
Buchanan, James, 972b.
Buenos Aires, 980d.
Bulgaria, 992b.
Butterfly, 1024b.
California, 1069a.
Canada, 1135b.
Chemistry, 1297b.
Chicago, 1315b.
Chile, 1336b.
China, 1351a.
Circulation, 1399b.
Cleveland, Grover, 1423b.
Coal, 1445b.
Colombia, 1479d.
Colorado, 1492a.
Columbus, 1503d.
Questions on—*Continued*
Connecticut, 1550a.
Corn, 1588b.
Cotton, 1609b.
Cuba, 1659b.
Delaware, 1746c.
Denmark, 1761b.
Ecuador, 1921c.
Egypt, 1972b.
England, 2049a.
Europe, 2101a.
Fillmore, Millard, 2173b.
Florida, 2219a.
Fly, 2233b.
Football, 2259b.
France, 2307a.
Garfield, James A., 2391d.
Georgia, 2459a.
Germany, 2481a.
Grant, U. S., 2571b.
Great Britain, 2593b.
Greece, 2609b.
Harrison, Benjamin, 2699b.
Harrison, William H., 2705d.
Hawaii, 2722d.
Hayes, Rutherford B., 2733b.
Idaho, 2915a.
Illinois, 2928a.
Indiana, 2957a.
Iowa, 3041a.
Ireland, 3053b.
Italy, 3085b.
Jackson, Andrew, 3097b.
Japan, 3123b.
Jefferson, Thomas, 3133b.
Johnson, Andrew, 3161b.
Kansas, 3209a.
Kentucky, 3230a.
Lincoln, Abraham, 3443b.
London, 3491b.
Louisiana, 3519a.
Madison, James, 3583b.
Maine, 3605a.
Manitoba, 3631a.
Maryland, 3675a.
Massachusetts, 3689a.
McKinley, William, 3574b.
Mexico, 3772b.
Michigan, 3787a.
Minnesota, 3833a.
Mississippi, 3849a.
Missouri, 3861a.
Monroe, James, 3899b.
Montana, 3909a.
Montreal, 3937b.
Nebraska, 4105a.
Netherlands, 4127b.
Nevada, 4137c.
New Brunswick, 4146c.
New Hampshire, 4159c.
New Jersey, 4167a.
New Mexico, 4176c.
New Orleans, 4179c.
New York, 4203a.
New York City, 4215a.
New Zealand, 4221d.
North America, 4255a.
North Carolina, 4265a.
North Dakota, 4273a.
Norway, 4287b.
Nova Scotia, 4299a.
Ohio, 4353a.
Oklahoma, 4363a.
Ontario, 4385a.
Oregon, 4409a.
Ottawa, Ont., 4428b.
Paraguay, 4487b.
Paris, 4497c.
Pennsylvania, 4571a.
Peru, 4602d.
Petrograd, 4613c.
Philadelphia, 4625a.
Philippine Islands, 4637b.
Pierce, Franklin, 4669b.
Polk, James K., 4741b.
Porto Rico, 4775d.
Portugal, 4784b.
Prince Edward Island, 4819c.
Prussia, 4855b.
Quebec (city), 4895c.
Quebec (province), 4891a.
Rhode Island, 5000a.
Questions on—*Continued*
Roosevelt, Theodore, 5075b.
Rumania, 5106b.
Russia, 5125a.
Saint Louis, 5161c.
San Francisco, 5192c.
Saskatchewan, 5215a.
Scotland, 5263b.
Serbia, 5313d.
South America, 5452b.
South Carolina, 5461a.
South Dakota, 5468a.
Spain, 5478b.
Sweden, 5650b.
Switzerland, 5665b.
Taft, William Howard, 5685b.
Taylor, Zachary, 5721b.
Tennessee, 5753a.
Texas, 5775a.
Turkey, 5915b.
Tyler, John, 5927b.
United States, The, 5997a.
Utah, 6015a.
Van Buren, Martin, 6030b.
Venezuela, 6050b.
Vermont, 6068a.
Virginia, 6098a.
Washington (state), 6192a.
Washington, D. C., 6198a.
Washington, George, 6207b.
West Virginia, 6251b.
Wilson, Woodrow, 6307b.
Wisconsin, 6337a.
Wyoming, 6373a.
*Quest of the Holy Grail*, 4452.
Quetico Forest Reserve (Canada), 4382c.
Quetta, Baluchistan, 565d.
Quetzal, 4901a.
Quetzalcoatl, 523a.
Queue, 1349b, 3620c.
Quichua, 2936d, 4600b.
Quick consumption, 5896a.
Quick grass, 1611d.
Quicklime, 3433c.
Quicksand, 4901c.
Quicksilver, 3742c.
Quiller-Couch, Sir Arthur Thomas, 4901c.
Quill of feather, 2144b.
Quill pens, 4556b.
Quince, 4902a.
Quincy, Ill., 4902b.
Quincy, Josiah, 4902a.
Quincy, Mass., 4902d.
Quinine, 116a, 1379d, 3718c, 4603c, 4903b.
Quinnat salmon, 936a, 5174b.
Quinoa, 2536c.
Quino-quino, 4603c.
Quinsy, 4903c.
Quintana, Dr. Manuel, 342a.
Quinte, 2151c.
Quintilian, 4903c.
Quintilis, 3182b.
Quintus Horatius Flaccus, 2835a.
Quipu system of recording events, 4603a.
Quirinal, 4903d.
Quirnal Palace, 4904a.
Quirinus, 4904a.
Quirites, 4904a.
Quitclaim, 1738c.
Quito, Ecuador, 4904b.
Quitus, ancient kingdom of the, 1921a.
Quoits, 4904d.
Quorum, 4905a.
Quotation marks, 4872a, 4905c.
Quotations for—
April, 303a.
August, 474a.
December, 1729a.
February, 2147a.
January, 3113a.
July, 3184a.
June, 3187a.
March, 3647a.
May, 3703a.
November, 4307a.
October, 4339a.
September, 5308a.

# R


R, 4906a.
Rabba, Africa, 4233d.
Rabbi, 4906a.
Rabbinical period, 2755a.
Rabbit, 2689a, 4906b.
Rabbit, Care of a, 4907b.
Rabbit-foot amulet, 240c.
Rabbit-foot clover, 1440a.
Rabboni, 4906b.
Rabelais, François, 4907b.
Raccoon, 4907d.
Raccoon Mountain, 124d.
Raccoon Mountain, 124d.
Race, 4908b.
Races of Men, 4909b.
Rachel (Bible), 4910b.
Rachel-Félix, Elisabeth, 4910c.
Racial map, Austria-Hungary, 504a.
Racial map, Europe, facing 2097.
Racine, Jean Baptiste, 4910d.
Racine, Wis., 4911a.
Racing, Automobile, 514b.
Racing, Motorcycle, 3975b.
Racing shells, 5093c.
Rack, 4911c.
Radcliffe, Ann, 4911c.
Radcliffe College, 4911c.
Radiation, 2749b.
Radical sign, 5514c.
Radioactivity, 4911d.
Radiolaria, 4912a.
Radish, 4912b.
Radium, 1295c, 4912c.
Radius, 372c, 1385d, 2681a, 5399d, 5494d.
Raemakers, Louis, 4123b.
Raffia and raffia weaving, 4913b.
Rafters, 1194d.
Ragged School, 5628a.
Ragnarok, 4044c.
Ragtime music, 4025c.
Ragweed, 4914c.
Rahway, N. J., 4914d.
Raikes, Robert, 4914d, 5628a.
Rail, 4915a.
Railroad, 4915b.
Railroad construction, 4918a.
Railroad frog, 6249b.
Railroad mileage, 4920b.
Railroad pooling, 5891c.
Railroad postoffice, 4791d.
Railroad telephone, 5741a.
Railroads, Transcontinental, 4920c.
Railroads in Canada, 1111c.
Rain, 4921a.
Rainbarrel mosquito, 3966d.
Rainbow, 4923a.
Raincoats, 5098c.
Rain-crow, 1667d.
Rainey, Paul J., 3454b.
Rainfall, 4921d.
Rainfall (factor in climate), 1432a.
Rainfall (in geology), 2434b.
Rainfall map, North America, 4253b.
Rainfall map, United States, 5953c.
Rainfall of Canada, 1105.
Rain gauge, 4923c.
Rainier, Mount, 4923d.
Rainless regions, 4922c.
*Rain, Steam and Speed,* 4452.
Rainy Lake, 4924b.
Rainy River, 4380b, 4924c, 6317a.
Raisin River, Massacre of, 4924c.
Raisins, 2574b, 4924c.
Rajah, 2006c, 4925c.
Rajputana, India, 804a, 3588a, 4925d.
Raki, 5313b.
Rakuto River, 1364b.
Raleigh, N. C., 4925d.
Raleigh, Sir Walter, 4926c.
Rallentando, 4026a.
Ralph Connor, 2537d.
Ralph Roister Doister, 5934b.
Rama, 4927c.
Ramadan, 2140b, 3873d.
Rama Krishna, 6102b.
Ramayana, 4927b.
Rambouillet, 5342b.
Ramee, Louise de la, 4927c.
Rameses II, 3730b, 4927d.
Ramezay, Chateau de, 3934b.
Ramie, 789c, 2160d.
Rampart, 1218d.
Rampart Range, 4672c.
Ramsay, David, 4928a.
Randolph, John, 4928b.
Random-coursed ashlar, 988b.
Range (surveying), 3309b.
Rangeley Lakes, 3600d.
Rangoon, India, 4928c.
Ranjit Singh, 5380b.
Rank, Insignia of, 5940b.
Rank in army and navy, 4928d.
Ranke, Leopold von, 4929c.
Rankin, Jeanette, 4929d, 6348a.
Rank of states, in area, 5973c.
Ranunculus, 4930c.
Raphael Santi, 4930c.
Rapids, 6216a.
Rappahannock, 4931c.
Rare coins, American, 4311d.
Rare coins, Canadian, 4312a.
Rare coins, English, 4312a.
Rare stamps, 4788b.
Raritan River, 4931d.
Raspberry, 4931d.
Raspberry sunshine, 4932b.
Rastadt, Treaty of, 6017d.
Rat, 4932b.
Ratchet, 4932c.
Ratel, 4932d.
Rates of—
  Exchange, 718c.
  Parcel post, 4491c.
  Pensions, 4575c.
  Postage (Canada), 4787b.
  Postage (United States), 4786d.
  Tax, 5714b.
Rathbone, Justus H., 4881a.
Ratio, 4933a.
Ration, 1236b.
Rationalism, 4933a.
Ratisbon, Bavaria, 4933b.
Ratitae, 729b.
Raton, N. M., 4933c.
Rat Portage, Ont., 3222a.
Rattan, 4933d.
Rattlesnake, 4933d.
Rauch, Christian Daniel, 4934c.
Ravana, 4927c.
Raven, 4934d.
Ravine deer, 2410c.
Rawlinson, Henry, 1671a.
Raw umber, 5937b.
Ray, 1780c, 4935c.
Raymond, Alta., 4935c.
Razor, 4935d.
Razor-billed auk, 478b.
Razor blades, 5542d.
Re, 4936a.
Reactions, 4936a.
Read, Opie Percival, 4936c.
Read, Thomas Buchanan, 4936c.
Reade, Charles, 4936d.
Reading, 4937a.
Reading (Montessori Method), 3923c.
Reading, Pa., 4943c.
Reading aloud, 4939a.
Reading and spelling, Measurement of, 1938a.
*Reading from Homer,* 2821b, 4453.
Reading of Earley, Rufus Isaacs, 4944a.
Reagan, John Henninger, 4944c.
Real estate, 4944d.
Real image, 3380b.
Real partners, 4519a.
Real property, 4598a, 4944d.
Realschulen, 505a, 2472b.
Reaping machine, 3553a, 4945a.
Rear-admiral, 57a, 4929a.
Reason, 4946a.
Reaumur scale, 5786d.
Rebate, 4946d.
Rebecca, 3069a.
Rebellion of 1837, 4947a.
Recall, The, 4948a.
Receipt, 4948c.
Receiver, 4948d.
Receiver, Telephone, 5737d.
*Recessional, The,* 3260c.
Rechabites, Independent Order of, 2318d.
Recife, 4588c.
Reciprocity, 4949b.
Reciprocity tariff, 5702d.
Reciprocity with Canada, 5682b.
Recirculated air, 2753b.
Reclamation Act, 3308d.
Reclamation Service, 4949c.
Recognition, 3728c.
Reconstruction, 2731a, 3160c, 4949c.
Record, Talking machine, 5690c.
Recreation, 3412a.
Recreation habits, 2742d.
Rectangle, 4950b.
Rectilinear angle, 256a.
Rectilinear plane, 4694d.
Rectum, 201b.
Reculet, Mount, 3191d.
Red, 4950b.
Red admiral butterfly, facing 1022.
Redbeard, 588b, 2321c.
Red-bellied woodpecker, 6352a.
Red-billed tropic bird, 5885a.
Red birch, 728b.
Redbird, 1182d, 4950c.
Red brass, 897c.
Redbreast, 5036d.
Red-breasted merganser, 3746a.
Red-breasted nuthatch, 4314d.
Red cedar, 3189d, 4950d.
Red Cliff, Alta., 4950d.
Red clover, 1439d.
Red Cross Societies, 2418c, 4951a.
Red Deer, Alta., 4952c.
*Red Deer at Chillingham,* 4453.
Red Desert, 6369a.
Red dog flour, 2221c.
Red drum, 4952d.
Red-Earth People, 2280d.
Red eye snake, 1574b.
Red-eye vireo, 6090d.
Red fir, 2178a.
Red fire, 5593c.
Redfish, 4952d.
Red flag, 4950c.
Red guava, 2633d.
Red head duck, 1164d, 1873b.
Red-headed woodpecker, 6352d.
Red Lake, 3828c.
Redlands, Cal., 4953a.
Redlands, University of, 4953b.
Red lead, 3356a.
Red-legged grasshopper, 2578a.
Red linnet, 3451d.
Redmond, John Edward, 4953c.
Redmouth, 2629c.
Red mulberry, 3996c.
Red mullet, 3998a.
Red oak, 4323a.
Red onion bulb, 989d.
Redouble (in cards), 924d.
Red peanut, 4540d.
Red pepper, 4578d.
Red phosphorus, 4648a.
Red pine, 4677d.
Red pipestone, 3829a.
Redpoll, 3451d.
Red puccoon, 777b.
Red raspberry, 4932a.
Red River, 4953d, 5769c.
Red River of the North, 4954a.
Red River Rebellion, 1124d, 4954c.
Red River Settlement, 3632b.
Red Room, 6274a.
Red salmon, 4953a, 5174b.
Red sandalwood, 5187b.
Red Sea, 4955b.
Red-shafted flicker, 6352a.
Red-shouldered hawk, 2723b.

Red-spotted newt, 4188b.
Red squirrel, 5518b.
Redstart, 4955d.
Red-top grass, 2576a.
Reduction of complex fractions, 2291d.
Reduction of decimal fractions, 1731c.
Reduction of fractions, 2283c.
Reduction plants, 5322b.
Red wines, 6311c.
Red Wing, Minn., 4956a.
Red-winged oriole, 757b.
Red-winged starling, 757b.
Red wolf, 6343d.
Redwood, 4956b, 5310a.
Reed, Thomas Brackett, 2698b, 4956c.
Reedbird, 788c, 4956d.
Reed canary-grass, 2576c.
Reed pens, 4556b.
Reed pipes, 4412b.
Reed Rules, 2698b.
Reef knot, 3270c.
Reel, 257c.
Reelfoot Lake, 5754d.
Reeve (bird), 5101b.
Reeve (in government), 1515b, 3707a, 5349b.
Reeves, William Pember, 4219b.
Reference libraries, 3402c.
Referendum, 2993a.
Refining of oil, 4614d.
Reflecting galvanometer, 1036c.
Reflecting telescope, 5743b.
Reflection, 4956d.
Reflection of light, 3423d.
Reflection of sound, 5444d.
Reflex action, 4957b.
Reflex angle, 256a.
Reflex arc, 4957b.
Reformation, 1612d, 3540b, 3724a, 4958a.
Reform Bill of 1832, 2591d, 2624a.
Reformed Church, 4961b.
Reform schools, 4961a.
Refracting telescope, 5743b.
Refraction of light, 3424b.
Refractometer, Inferential, 3780c.
Refrigeration, 1469c.
Regelation, 4961c.
Regensburg, Bavaria, 4933b.
Regent, 4961d.
Regent diamond, 1786b, 2414c.
Regiment, 4961d.
Regimental court-martial, 1613c.
Regimental officers, 4929b.
Regina, Sask., 4962a.
Registered bonds, 807c.
Register of Debates, 1536d.
Register of the United States, 5867c.
Registration of births, deaths and marriages, 4962d.
Registration of voters, 1977c.
Regnant, Queen, 4898d.
Regnault, Jean Baptiste, 2549a.
Regular cubic system of crystallization, 1654c.
Regular pyramid, 4876b.
Regular verbs, 6056d.
Regulus, 446a, 3382b.
Regulus, Marcus Atilius, 4963a.
Regurgitation, 2747c.
Rehan, Ada, 4963b.
Reichenbach Falls, 5659d.
Reichsrath, 497b.
Reichstadt, Napoleon François Charles Joseph Bonaparte, Duke of, 4067b, 4963c.
Reichstag, 2473c, 4963c.
Reid, George Agnew, 4963d.
Reid, John Dowsley, 4963d.
Reid, [Thomas] Mayne, 4964a.
Reid, Whitelaw, 4964a.
"Reign" of Andrew Jackson, 5984b.
Reign of Terror, 2336a, 5035d.
Reikjavik, Iceland, 4990d.
Reincarnation, 5860b.
Relief, 4965a.
Reims, France, 4991d.
Reindeer, 137d, 4964c.
Reindeer Lake, 5211b.
Reindeer lichens, 3406a.
Reinforced concrete, 1527a.
Relapsing fever, 2159d.
Relation of parents and teachers to play, 4705d.
Relative humidity, 2870c.
Relative pronouns, 4838a.
Relay (telegraphy), 5734b.
Relief engraving, 2058a.
Relief maps, 3641b.
Relief photo-engraving, 4648c.
Religion, 4965a.
Religions of Asia, 420b.
Religions of Europe, 2094d.
Religious denominations, United States, 5950b.
Religious liberty, 4967a.
Religious statistics of the world, 4965b.
Rembrandt, 4968b.
Remedial law, 3349d.
Reményi, Edouard, 4969a.
Remington, Frederic, 4969a.
Remittent fever, 2159c.
Remson, Ira, 4969b.
Remus, 5066b.
Renaissance, 4958c, 4969c.
Renaissance architecture, 326d.
Renaissance sculpture, 5275a.
Renal artery, 3237b, 6004d.
Renal calyx, 3237c.
Renal vein, 3237b.
Renan, Ernest, 4970b.
Renewal of patent, 4524c.
Renfrew, Ont., 4970c.
Reni, Guido, 2635c.
Rennes, France, 4970d.
Rennin, 1796d.
Reno, Nev., 4971a.
Rensselaer, N. Y., 4971c.
Rent, 4971d.
Reorganites, 3342d.
Reorganized Church of Jesus Christ of Latter Day Saints, 3342d.
Repeater (telegraphy), 5734c.
Replevin, 4972d, 6363d.
*Reply to Hayne*, 6235b.
Reporter's duties, 4185a.
Repoussé, 2020c, 3400c, 5272d.
Repplier, Agnes, 4973a.
Representative democracy, 4975b.
Representatives, House of, 4973a.
Representatives, Qualifications of, 4974a.
Reprieve, 4492b, 4974c.
Reproduction by stems, 5546c.
Reproductive imagination, 2933a.
Reptiles, 4588b, 4974c.
Reptile study, 4087c.
Republic, 4974d.
*Republic*, Plato's, 4702d.
"Republican elephant," 4071d.
Republican party, 4735c, 4976b.
Republican River, 4102b.
Republic of Colombia, 1479b.
Republic of Panama, 4469b.
Republic of Rome, 5057d.
Republic of the United States of Central America, 1254a.
Requiem mass, 3682c.
Requisition, 2117b.
Resaca de la Palma, Battle of, 4978a.
Reservoir, 4978a.
Resh, 4906a.
Resht, Persia, 4594a.
Resident (in government), 4925c.
Resident commissioners, 5764d.
*Resignation*, 1721a.
Resins, 4978c.
Respiration, 912d.
Responsible government, Struggle for, 1123a.
Responsions, 5002d.
Rest (music), 4023d.
Restigouche River, 4978d.
Restoration, 4979a.
Restoration, Literature of the, 2056c.
Restoration king of France, 3510c.
Restrictive endorsement, 4111c.
Resultant, 1522c.
Results of education, Measuring, 1933b.
Resumption of 1879, 5487a.
Resumption of specie payments, 2732c.
Resurrection, 4979c.
Reszke (family), 4979d.
Retainer, 2158c, 4980b.
Retard (music), 4026a.
Retarded velocity, 6045b.
Retching, 6116b.
Retina, 2118b.
Retinitis, 769d.
Retriever, 4980b.
Retting, 2205d, 2767d.
*Return from the Farm*, 4453.
*Return of the Gleaners*, 4453.
*Return of the Mayflower*, 4453.
Reuben, 3174a.
Reunion Island, 4980c.
Reuter Agency, 430c.
Reval, Russia, 4980c.
Revelation, Book of, 4980d.
Revelstoke, B. C., 4981a.
Revelstoke, Mount, 4981b.
Revenue, Inland, 3018b.
Revenue, Internal, 3017b.
Revenue-cutter service, 4981b.
Revere, Mass., 4982b.
Revere, Paul, 3396c, 4982c.
Reverse of coin, 4311c.
Reversing Falls, 5154a.
Revolution, 4983a.
Revolutionary War in America, 2591a, 4983b, 5978c, 6203b.
Revolution of earth, Annual, 1903c.
Revolver, 4990a.
Rexford, Eben Eugene, 4990c.
*Rex Imperator*, 2936b.
Reykjavik Iceland, 4990d.
Reynolds, Sir Joshua, 4990d.
Rhadamanthus, 4991b.
Rhea, 4991b.
Rhea (myth), 4991d.
Rheims, France, 4991d.
Rheims cathedral, 1228a, 4992b.
Rheinhessen province, 2788b.
Rhenish Palatinate, 4457c.
Rhetoric, 4992c.
Rheumatic fever, 4993a.
Rheumatism, 3720a, 4993a.
Rhine River, 4993c.
Rhine of America, 2860b.
Rhine provinces, 4854c.
Rhinoceros, 4994c.
Rhinoceros bird, 4995c.
Rhiva, Greece, 5783b.
Rhode Island, 4995a.
Rhodes, 5000d.
Rhodes, Cecil John, 88b, 5001a.
Rhodesia, 5001d.
Rhodes Scholarships, 5002b, 5003a.
Rhodium, 1295a.
Rhododendron, 5003a.
*Rhodora*, 2023a.
Rhomboid, 4882b.
Rhomb spar, 1834d.
Rhombus, 5003c.
Rhone River, 5003d.
Rhubarb, 5004a.
Rhyme, 5004c.
*Rhyme of the Rail*, 4915b.
*Rhyme Words* (game), 2378a.
Rialto Bridge, 6051c.
Ribbed vault, 6041c.
Ribbon, 5005a.
Ribbon Falls, 6397b.
Rib grass, 4700a, 6238b.
Rib Hill, 6331b.
Ribot, Alexandre Felix Joseph, 5005b.

Ribs, 5399b.
Ricardo David, 5005b.
Rice, 5005c.
Rice, Alice Caldwell Hegan, 5008d.
Ricebird, 788c, 5007a.
Rice continent, 2554b.
Rice meal, 5008a.
Rice polish, 5007c.
Rice starch, 5008a, 5530c.
Rice weevil, 6240a.
Rice wine, 5007d.
Richard I, England, 774d, 4628c, 5009a.
Richard II, England, 5009b.
Richard Saunders, 4755a.
Richardson, Sir Benjamin, 253b.
Richardson, John, 1142d, 5010a.
Richardson, Samuel, 5010b.
Richelieu, Armand Jean Du Plessis, 5010c.
Richelieu River, 4888c, 5011b.
Richmond, Borough of, 4205c.
Richmond, Ind., 5011b.
Richmond, Va., 5011d.
Richmond Bay, 4818d.
Rich Mountain, 5456d.
Richter, Jean Paul, 2465d.
Richter, Johann Paul Freiderich, 5013c.
Rickets, 5013d.
Riddle of the sphinx, 5495d.
Rideau Canal, 4427b, 5014a.
Rideau Falls, 4427a.
Rideau River, 4429c.
Ridgway, Robert, 5014c.
Riding, 5014d.
Riding plow, 4709b.
Ridley, Nicholas, 5015a.
Ridpath, John Clark, 5015c.
Riel, Louis, 1125a, 4954d, 5015c, 5216c.
Riel Rebellion medal, 5216d.
Rienzi, Cola Di, 5016b.
Riesengebirge, 5016c.
Rietschel, Ernst, 5016d, 5276c.
Rifle, 5017a.
Riga, Gulf of, 5018b.
Riga, Russia, 5018a.
Rigdon, Sydney, 3951d, 5414d.
Rigel, 446b.
Rigeret, 1759d, 4288a.
Riggs, Kate Douglas Wiggin, 5018c.
Right angle, 255d.
Right ascension, 409a.
Right bank of a river, 5024d.
Right bower, 2088d.
Right habits, 2653b.
Right of asylum, 450b.
Right of eminent domain, 2026b.
Right of possession, 5820c.
Right of sanctuary, 450a.
Right of search, 5283d.
Right of way, 1907c.
Right pleura, 4707b.
Rights, Bill of, 719c.
Right triangle, 5876a.
Right whale, 6260b.
Rigsdag, 1759b.
*Rig-Veda*, 3997d, 6041d.
Riis, Jacob August, 5018d.
Riley, James Whitcomb, 1207d, 5019a.
Rimouski, Que., 5019d.
Rimouski Forest Reserve, Canada, 4890a.
Rinderpest, 5020a.
Rinehart, Mary Roberts, 5020b.
Ring, 5020c.
*Ring and The Book*, 5021c.
Ringghut, Mount, 3126d.
Ring plover, 4708b.
Rings of Saturn, 5219d.
Ring-stones, 318c.
Ring-tailed lemur, 3379b.
*Ring-toss* (game), 2375c.
Ringworm, 5021c.
Rio Colorado, 1494a.
Rio De Janeiro, Brazil, 901a, 5022a.
Rio de la Plata, 4701b.
Rio de Oro, 84b, 5476b.
Rio Grande, 3765b, 5023b.
Rió Negro, 5023c.
Rio Pecos River, 4172c.
Riot, 5023d.
Riot Act, 5024a.
Rio Teodoro (Theodore), 900d, 3579a, 5076c.
Rio Verde Valley, 362c.
Riparian proprietor, 5024b.
Riparian rights, 5024a.
Ripening cream, 1019b.
Ripon Falls, 6082a.
Riposte, 2151c.
Rippling, 2205d.
Ripuarian Franks, 2316d.
*Rip Van Winkle*, 5024b.
Rise (of arch), 318d.
Ristori, Adelaide, 5024b.
Ritty, James, 1215b.
*Ritual*, 916b.
River, 5024c.
River and flood division of Weather Bureau, 6231d.
River birch, 728b.
River ducks, 1873c.
River floods, 2210a.
River homes, 1163c.
River Lapps, 3322a.
River of Doubt, 900d.
Riverside, Cal., 5026c.
Riverside Drive, 4207a, 4211a.
Rivers of Maine, 3601b.
Rivers of the world, Greatest, 3851a.
Rives, Amelie, 5027a.
Riviera, 5027a.
Riviera di Chiaia, 4061b.
Rivière du Lièvre River, 4429c.
Rivière du Loup, Que., 2318a.
Rizal, José, 4634b.
Rizzio, David, 3677d.
Road making, 5031d.
Road runner, 5027c.
Roads and streets, 5028a.
Roadster (automobile), 514a.
Roadster (horse), 2840a.
Roanoke, John Randolph of, 4928c.
Roanoke, Va., 5033a.
Roanoke River, 5033b.
Roaring forties, 4814d.
Roaring Mountain, 6391c.
Roasting, 1566c.
Robbery, 5033c.
Robbia (family), 5033d.
Robbia ware, 5033d.
Robert II, 5262a.
Robert College, 1557b.
*Robert of Lincoln*, 788d.
Robert of Sorbon, 5442b.
Roberts, Charles George Douglas, 5034a.
Roberts, Frederick Sleigh, Earl of Kandahar, Pretoria and Waterford, 5034c.
Robertson, John Ross, 5035a.
Robespierre, Maxmillien Marie Isidore, 5035b.
Robidoux, Joseph, 5155a.
Robin, 5036a.
Robin Goodfellow, 4683d.
Robin Hood, 5036d.
"Robin Hood of Scotland," 5038b.
Robinson, Sir John Beverley, 5037b.
Robinson Crusoe, 5037c.
Robinson Crusoe's island, 1335d.
Roblin, Sir Rodmond Palen, 5037d.
Rob Roy, 5038a.
Robsart, Amy, 3231c.
Robson, Mount, 933b, 942b, 5038c.
Robusti, Jacopo, 5817b.
Roc, 5038c.
Roca, Julio, 339b.
Rocha, Uruguay, 6007a.
Rochambeau, Jean Baptiste, 4590a, 5038d.
Roche, William James, 5039a.
Rochefort, Victor Henri, 5039b.
Rochelle salts, 5178d.
Rochester, Minn., 5039c.
Rochester, N. Y., 5039d.
Rock, 3816b, 5040c.
*Rock-A-Bye, Baby*, 3316d.
Rock asphalt, 426a.
Rock Creek, 6194a.
Rock crystal, 4886b.
Rockefeller (family), 5040d.
Rockefeller Foundation, 5041d.
Rockefeller Institute for Medical Research, 5042b.
Rocket, 5042c.
*Rocket*, The, 3476c, 5547d.
Rockford, Ill., 5043a.
Rock Island, Ill., 5043c.
Rockland, Ont., 5044a.
*Rock of Ages*, 2895b.
"Rock of Chickamauga," 1319a, 5793c.
Rock pigeon, 4671a.
Rock River, 5044a
Rock salt, 5176a.
Rock wren, 6361c.
Rocky Mount, N. C., 5044c.
Rocky Mountain Forest Reserve, 5045c.
Rocky Mountain grasshopper, 2577d.
Rocky Mountains, 5044b, 5948a.
Rocky Mountains National Park, 2502c, 4505c.
Rocky Mountains Park (Canada), 4506d, 5045c.
Rocky Mountain whitefish, 6273a.
Rocky Mountain white goat, 5046c.
Rodentia, 5046d.
Rodents, 5046d.
Roderick, 2542d.
Rodin, Auguste, 5047a.
Rod planer, 4696d.
Rodrigo, 1377d.
Rodzianko, Michael, 5120a.
Roe, 5048a.
Roe, Edward Payson, 5047d.
Roebling, John A., 5874c.
Roebuck, 5048a.
Roentgen, William Konrad, 5048a.
Roentgen rays, 5048b.
Rogation days, 5049a.
Rogation week, 5049a.
Roger, Robert, 5049c, 5080a.
Rogers, John, 5049a.
Rogers, Randolph, 5049b, 5277a.
Rogers, William Barton, 3691c.
Rogue River, 4403c.
Rohlfs, Anna Katharine Green, 5049c.
Rohlfs, Charles, 5049d.
Rohlfs, Friedrich Gerhard, 5050a.
Rojestvensky, Sinovi Petrovich, 5050b.
Roland, 1273d, 5050c.
Roland de la Platiere, Madame (Manon Jeanne Philipon), 5050c.
Rolfe, John, 4717d, 5051a.
Rolfe, Thomas, 4717d.
Rolling mill, 5051b.
Rollo, 4247d.
Roll sulphur, 929b.
Roman calendar, 1051b.
Roman Catholic Church, 4755b, 5051d.
Roman Catholic emancipation, 2591c, 4686c.
Romance, 5053d.
Romance languages, 5054b.
Roman circus, 1390a.
Roman consul, 1561a.
Roman Empire, 477c.
Romanesque architecture, 326a.
Roman gods, 4044a.
Romani, 2647d, 4904a.
Roman method of pronouncing Latin, 3341b.
Roman notation, 4291b.
Roman numerals, 5054c.
Romanoff (family), 5055a.

Romans, Epistle to the, 5055c.
Romansh language, 5660a.
Roman spear, 5486b.
Roman sword, 5666a.
Romantic Age, in literature, 2057b.
Romanticism, 5055d.
Romantic opera, 4389a.
Roman walls, 5056b.
Roman wormwood, 4914c.
Rome, 5056b.
Rome, Ga., 5065b.
Rome, N. Y., 5065c.
*Romeo and Juliet*, 5066a, 6070b.
*Romola*, 2011c.
Romulus, 5066b.
Romulus Augustus, 4343a.
Roofing, 1195d, 5353c.
Roof of the continent, 2502c.
Roof of the world, 2797a, 4466d.
Roofs, 5067a.
Rook, 5067c.
Rookwood pottery, 5067d.
*Roosevelt, The*, 4726a.
Roosevelt, Theodore, 4833a, 5068b.
Roosevelt Dam, 357a.
Rooster Rock, 4403d.
Root (mathematics), 5077b.
Root, Elihu, 5077b.
Root, George Frederick, 5078a.
Root graft, 2550d.
Root hairs, 5078c.
Roots, 5078b.
Roots of a hair, 2659b.
Roots of corn, 1587b.
Roots of trees, 5870b.
Rope, 5078d.
Roquefort cheese, 1291b.
Roquer, Emma de, 1074a.
Rorqual, 5079b.
Rosa, Monte, 3914a.
Rosaceae, 5082a.
Rosalia, Saint, 4458a.
Rosamond, 5079c.
Rosario, Argentina, 4489d, 5079c.
Rosary, 5079d.
*Rosary, The*, 5080a.
Rose, 5080a.
Rose (family) 856d, 5082a.
Roseate spoonbill, 5507d.
Rosebery, Archibald Philip Primrose, 5082b.
Rose-breasted grosbeak, 2626d.
Rosebud Reservation, 5463b.
Rosecrans, William Starke, 5082d.
Rose cut (diamond), 2413b.
Rose geranium, 2462b.
Rosemary, 5083a.
Rose of Jericho, 5294a.
Rose of Sharon, 2791c.
Rose-ringed parrakeet, 4512d.
Roses, Wars of the, 5083a.
Rosetta stone, 5083b.
Rose tulip, 5899a.
Rose window, 5083d.
Rosewood, 5083d.
Rosicrucians, 4331c.
Rosin, 4679a, 5084a.
Rosin soaps, 5424a.
Ross, Alexander, 1142c, 5084b.
Ross, Betsy, 2195a, 4062c, 5084b.
Ross, Sir George William, 5084d.
Ross, Sir James Clark, 4728c, 5085a.
Ross, John, 4279d.
Ross Barrier, 276d, 4730a.
Rossetti, Christina Georgina, 5085b.
Rossetti, Dante Gabriel, 5085c.
Rossignol, Lake, 4297a.
Rossini, Gioachino Antonio, 5086a.
Rossland, B. C., 5086c.
Rostand, Edmund, 5086d.
Rosthern, Sask., 5087a.
Rostock, Germany, 5087b.
Rostrum, 2766a.
Roswell, N. M., 5087c.
Rotary printing, 4826c.
Rotary snow plow, 5423a.
Rotation of crops, 2156a, 5087d.
Rothamsted experimental station, 104b, 5088b.
Rothschild (family), 5088c.
Rotten boroughs, 2624b, 5089a.
Rotterdam, Holland, 5089b.
Roubaix, France, 5089c.
Rouble, 5100c.
Rouen, France, 5089d.
Rouge, 5090a.
Rouge-et-Noir, 5090b.
Rouges (Reds), 4736a.
Rough-legged hawk, 2723d.
Rough-on-rats (antidote), 282c.
"Rough Riders," 5071a, 5090c, 6350a.
Roulette, 5090c.
Roumania, 5103a.
Rounders, 5091a.
Roundheads, 5091b.
Rounding the Horn, 2837a.
Round-leaved sundew, 5628d.
Round pompano, 4748d.
Round steak, 658d.
Round Table, 5091b.
Round Towers, 5091d.
Rousseau, Jean Jacques, 5092a.
Rouzaud, Auguste, 4238c.
Rowan tree, 3979a.
Rowell, Newton Wesley, 5092d.
Rowing, 5093a.
Rowlands, John, 5525b.
Rough Stone Age, 1399c.
Royal, Mount, 3933b.
Royal Arcanum, 2319a.
Royal Arch Masons, 2318d.
Royal Gorge, 5093c.
Royal Institution of Great Britain, 5094a.
Royal Humane Society, 2868c.
Royal metals, 73d.
Royal mint, Ottawa, 1128c.
Royal National Lifeboat Institution, 3420d.
Royal Naval College, 4093b.
Royal Northwest Mounted Police, 5094b.
Royal Palace, Christiania, 4285c.
Royal palm, 4463a.
Royal Society, 5096a.
Royal standard (British), 2197d.
Royal supremacy, 5638c.
Royal water, 2524a.
Royal water-lily, color plate, facing 2224.
Royce, Josiah, 5096c.
Roycroft shop, 2857c.
Ruad, Phoenicia, 4645a.
*Rubaiyat*, 2191d, 5096c.
Rubber, 901a, 902a, 2534d, 5097a, 5098b.
Rubble wall, 988b.
Rubellite, 5849a.
Rubens, Peter Paul, 5099b.
Rubicon River, 1042d, 5099d.
Rubidium, 1295a.
Rubinstein, Anton Grigorovich, 5100a.
Ruble, 5100c.
Ruby, 5100d.
Ruby-crowned kinglet, 3257c.
Ruby-throated humming bird, 2871b.
Rude, François, 5101a, 5276b.
Ruddy duck, 1873c.
Rue, 4495a.
Ruff, 5101b.
Ruffed grouse, 2628c.
Ruffed lemur, 3379b.
Ruffo, Titta, 5101c.
Rugby, American, 2255a.
Rugby, Canadian, 2258a.
Rugby, English, 2258a.
Rugby School, 5101c.
Rugs, 1198a.
Ruisdael, Jacob, 5130d.
Ruiz, Juan, 5472c.
Rule of three, 4843b.
Rulers of England, 2043c.
Rulers of France, 2302a.
Rulers of the world, 5102c.
Rules in spelling, 5491a.
Rum, 5102d.
Rumania, 5103a, 6161d.
Rumelia, 5106c.
Ruminants, 5106c.
Rump Parliament, 3500b, 5106d.
Rundle Mountain, 5046a.
Runes, 5107a.
Runjit Singh, 5107c.
Runnimede, 5107d.
*Run, Sheep, Run* (game), 2377d.
Rupee, 5107d.
Rupert, Prince, 5108a.
Rupert's Land, 5108b.
Rupture, 2783b.
Rural credits, 5108c.
Rural free delivery, 4791b.
Rural population, 4761c.
Rush, 5110a.
Rush, Benjamin, 5110b.
Rushlights, 5110b.
Ruskin, John, 406c, 5110c.
Russell, Lord John, 5111b.
Russell, John Scott, 5111d.
Russell, Scott, 5356b.
Russell, Sol Smith, 5112a.
Russell, Lord William, 5132c.
Russell Sage Foundation, 5112a.
Russet orange, 4394b.
Russia, 5112b, 6164c.
Russia, Flag of, 2199c.
Russian army, 384b.
Russian national hymn, 2894a.
Russian thistle, 5793a, 5900a.
Russian Turkestan, 5906b.
Russian wolfhound, 2625c.
Russo antico ware, 6237d.
Russo-Japanese War, 803b. 4778a, 5126b.
Russo-Turkish Wars, 5127d.
Rust, 3061a, 5128c.
Rusts, 5128d.
Rutabaga, 5918d.
Ruth, 5129a.
Ruthenians, 5113c, 5129b.
Ruthenium, 1295a.
Rutherford, Alexander Cameron, 5129c.
Rutile, 5129d.
Rutland, Vt., 5130a.
Rutledge, John, 5130b, 5639d.
Ruwenzori Mountain, 4657d.
Ruy Diaz, 1377d.
Ruysch, Frederick, 2019c.
Ruysdael, Jacob, 5130c.
Ruyter, Michael Adriaanszoon de, 5131a.
Ryan, Abram Joseph, 5131a.
Ryan, Patrick John, 5131b.
Rydal Mount, 6357a.
Rye, 5131c.
Rye bread, 5132b.
Rye House Plot, 5132c.
Ryerson, Egerton, 5132d.
Rye whisky, 6268d.
Ryswick, Treaty of, 5133d.

# S

S, 5134a.
Sabanilla, 599c.
Sabatier, Paul, 2310d.
Sabbath, 5134a.
Sabbath day's journey, 5134b.
Sabine-Neches Canal, 1147b.
Sabine Pass, 5134d.
Sabine River, 5134d, 5769c.
Sabines, 5134d.
Sable, 5135a.
Sable antelope, 278d.
Sable Island, 5135b.
Sabot, 838a.
Sabotage, 5135c.
Sacagawea, 3395b.
Saccharin, 5136a.
Saccharine sorghums, 5442d.
Sachs, Hans, 5136b.
Sac Indians, 5136a.
Sackville, N. B., 5136c.
Saco River, 5136c.
Sacrament, 5136d.
Sacramento, Cal., 5136d.

Sacramento River, 5137c.
Sacraments of the Roman Catholic Church, 5052a.
*Sacred and Profane Love,* 4453.
Sacred bark, 1212d.
Sacred College, 1182d, 5137d.
Sacred Gate, 454a.
Sacred geese of Rome, 2535d.
Sacred ibis of Egypt, 2901b.
Sacred music, 4019c.
Sacred Stand, 5396a.
Sacred Way, 5062d.
Sacrifice, 5137d.
Sacrum, 4555c, 5399b.
Saddle grafting, 2551c.
Saddle Mountain, 3683d.
Sadducees, 5138a.
Sadi, 5138b.
Sadowa, Battle of, 5138c.
S. A. E. rating, 2843a.
Saeters, 4284d.
Safe, 5138c.
Safety bicycle, 713a.
Safety lamp, 5138d.
Safety match, 3695a.
Safety razor, 4935d.
Safety valve, 5139a.
Safflower, 5139b.
Saffron, 1642c, 5139c.
Safid Rug River, 4595a.
Sagamore, 5694d.
Sagamore Hill, 5068a.
Sagas, 2465a, 5139c.
Sagasta Praxedes Mateo, 5140a.
Sage, 5140a.
Sage, Margaret Olivia Slocum, 5140b.
Sage, Russell, 5140b.
Sagebrush, 5140c.
Sagebrush State, 4132b.
Sage grouse, 2629b.
Sage of Monticello, 3135a.
Saghalien Island, 5168d.
Saginaw, Mich., 5141d.
Sagittarius, the Archer, 5141b.
Sago, 5141c.
Sago palm, 4462d.
Saguenay and Labrador Forest Reserve, 4890a.
Saguenay River, 5142a.
Saguntum, 5476d.
Sahama, Mount, 249c.
Sahara, 85a, 5142c.
Saida, Asia Minor, 5374a.
Said Pasha, 1970c.
Saiga, 278d.
Saigon, 5143b.
Sailboat and sailing, 5143c.
Sailing ships, 5356a.
"Sailor King" of Great Britain, 6291b.
Sailor's choice, 2629c.
Sailors' lighthouse, 6111b.
Saima Lake, 2176b.
Saint, Thomas, 5328c.
Saint Andrews, N. B., 5144c.
Saint Andrew's cross, 1646a, 2197a.
Saint Anne lock, 5014b.
Saint Anthony, Falls of, 3826a.
*Saint Anthony and the Christ Child,* 4453.
Saint Anthony's cross, 1646b.
Saint Anthony's fire, 2074c.
Saint Augustine, Fla., 5144d
Saint Augustine Inlet, 5144d.
Saint Bartholomew's Day, Massacre of, 5145c.
Saint Bernard (Great and Little), 5146c.
Saint Bernard dog, 5146a.
Saint Boniface, Man., 5146d.
Saint Catherine Lake, 6063d.
Saint Catharines, Ont., 5147b.
Saint Charles, Mo., 5147c.
Saint Christopher, 3370b, 5147d.
Saint Clair, Arthur, 5148c.
Saint Clair, Lake, 5148a.
Saint Clair Flats, 1779d.
Saint Clair Flats Canal, 1147b, 5148b.
Saint Clair River, 5148b.
Saint Cloud, Minn., 5148d.
Saint Croix, Island of, 4300c.
Saint Croix Island, 6100c.
Saint Croix River, 6331d.
Saint-Cyr, Laurent Gouvion, 5149a.
Saint-Denis, France, 5149b.
Sainte Anne de Beaupré, Que., 5149c.
Sainte-Barbe, 587c.
Sainte-Beuve, Charles Augustin, 5149c.
Saint Elias, Mount, 5150a.
Saint Elias Mountains, 5149d.
Saint Elmo's fire, 5150a.
Saint Etienne, France, 5005a, 5150b.
Saint Francis, 2310d.
Saint Francis, Lake, 5156c.
Saint Francis River, 3731c, 4888c.
Saint Francis Xavier, 6375b.
Saint Gall, Abbey of, 3b.
Saint Gaudens, Augustus, 5150c.
Saint Geneviève, Church of, 4478c.
Saint George, 2451b.
Saint George and the dragon, 5151b.
Saint George Island, 4815c.
Saint George's Channel, 5151c.
Saint George's cross, 2197a.
Saint Gotthard, 5151c.
Saint Gotthard tunnel, 5151d.
Saint Helena, Island of, 4066c, 5151d.
Saint Helens, Mount, 4404a, 6187b.
Saint Helen's Island, 3933b.
Saint Helier (Channel Islands), 3140b.
Saint Hyacinthe, Que., 5152b.
Saint Ignatius of Loyola, 3143c, 3529a.
Saint Jean, Que., 5154c.
Saint Jerome, Que., 5152c.
Saint John, John P., 4835d.
Saint John, Lake, 4888d.
Saint John, N. B., 5152d.
Saint John Island, 6100d.
Saint John River, 5153c.
Saint Johns, Newfoundland, 5154a.
Saint Johns, Que., 5154c.
Saint John's bread, 1192a.
Saint John's River, 2213b.
Saint Joseph, Mo., 5154c.
Saint Kitts, 3370b, 5147d.
Saint Lambert, Que., 5155b.
Saint Lawrence, Gulf of, 5155d.
Saint Lawrence Islands Park, 4506d, 5157b.
*Saint Lawrence River,* 5156b.
Saint Leger, Barry, 5157d.
Saint Louis, Mo., 5158a, 5969a.
Saint-Louis, Senegal, 5302b.
Saint Louis River, 5156b
Saint Mark's, Campanile of, 1086d.
Saint Mark's, Cathedral of, 5162a.
Saint Marks, Piazza of, 6051d.
Saint Martin's summer, 2971a.
Saint Marys, Ont., 5162c.
Saint Mary's Falls Canal, 1147b.
Saint Mary's River, 2597b, 5162c.
Saint Maurice Falls, 5340a.
Saint Maurice Forest Reserve, 4890a.
Saint Maurice River, 4888c, 5162d.
Saint Michael, Alaska, 6404d.
Saint Michael, Feast of, 3778c.
Saint Moritz, Switzerland, 5162d.
Saint Patrick's Cathedral, New York, 1228b.
Saint Patrick's day, 4526b.
Saint Paul, Minn., 5163a.
Saint Paul de Loanda, P. W. A., 5165a.
Saint Paul Island, 4815c.
Saint Paul's, London, 3489d.
Saint Peter, Lake, 5156c.
Saint Peter Port, Channel Is., 2635b.
Saint Petersburg, Fla., 5165b.
Saint Petersburg, Russia, 4611b, 5165b.
Saint Peter's Church, Philadelphia, 4623b.
Saint Peter's Church, Rome, 5165c.
Saint-Pierre, Jacques Henri Bernardin de, 5166a.
Saint-Pierre Island, 5166a.
Saint-Quentin, France, 5166c.
Saint-Quentin Canal, 5166c.
Saint Regis River, 5156c.
Saint Rosalia, 4458a.
Saint-Saëns, [Charles] Camille, 5166c.
Saint Sampson, Channel Is., 2635b.
*Saint Sebastian,* 4453.
Saint-Simon, Claude Henri Count de, 5167a.
Saint Sophia, Interior of, 325a, 5167b.
Saint Stephen, Cathedral of, 6083b.
Saint Stephen, N. B., 5167d.
Saint Thomas, Ont., 5168a.
Saint Thomas, Virgin Is., 5168a.
Saint Thomas Island, 6100d.
Saint Vincent, B. W. I., 5168b.
Saint Vitus's dance, 1947c, 5168c.
Sake, 3119b, 5007d.
Sakhalin Island, 5127c, 5168d.
Sakonnet River, 4997b.
Salaberry - de - Valleyfield, Que., 5169a.
Saladin, 5169b.
Salamander, 5169c.
Salamander gopher, 2536d.
Salambria River, 5744c, 5789b.
Salamis, 5169d, 5882d, 6376d.
Sal ammoniac, 5170a.
Sal ammoniac battery, 1981a.
Salaries of rulers, 1401d.
Salary grab, 2570b, 5170b.
Salary of President, 4813a.
Salayer Islands, 5170b.
Sale, Bill of, 719d.
Salem, Mass., 5170c.
Salem, O., 5171b.
Salem, Ore., 5171c.
Salem Canal, 1147b.
Salem witchcraft, 6341b.
Salep, 4400c.
Saleratus, 5429b.
Saleyer Islands, 5170b.
Salian Franks, 2316d.
Salicin, 3720a.
Salic law, 5171d.
Salicylic acid, 5172a.
Salina, Kan., 5172b.
Salinometers, 2889c.
Salisbury, Rhodesia, 5002b.
Salisbury, Robert Arthur Talbor Gascoyne-Cecil, 5172c.
Salisbury Cathedral, 2036a.
Salish Indians, 2204b.
Saliva, 5173a.
Salles, Campos, 907a.
Sallust, 5173b.
*Salmagundi,* 3067c.
Salmon, 4584a, 5173c.
Salmon pike, 4034a.
Salmon River, 2910d.
Salmon River dam, 2912c.
Salmon trout, 5174d.
Salol, 5174d.
Salon, The Paris, 5175a.
Saloniki, 5175a.
Salsify, 4441b.
Sal soda, 5429b.
Salt, 4198a, 5175c.
Salt, Folklore of, 5635a.
Saltair Beach, 2599a, 5177c.
Salt Lake City, Utah, 3952d, 5177b.
Salt Lake State, 6009b.
Salt-marsh cockspur grass, 2576b.
Salto Grande Rapids, 6009c.
Salton Sea, 5178b.

Saltpeter, 5178c.
Salt pork, 4763d.
Salt rheum, 1922b.
Salt-rising bread, 909c.
Salt River project, 356c.
Salts, 5178d.
Salts of sorrel, 4435c.
Salt-water soap, 5424c.
Saltwort, 201d.
Salutations in New Zealand, 4220a.
Salvador, 5179a.
Salvage, 2221a, 5180a.
Salvation Army, 5180b.
Salvator (horse), 4909a.
Salvator Rosa, 4449d.
Salvini, Tommaso, 5180d.
Salzgarten, 5175d.
Samana Bay, 2662a.
Samaria, 5181a.
Samaritans, 5181a.
Samarium, 1295a.
Samarkand, Russian Turkestan, 5181c.
Sama-Veda, 6042a.
Sambos, 4600d.
Sambuke, 1976b.
Samech, 6375a.
Sam Jones, 3171b.
Samnites, 5181d.
Samoa, or Samoan Islands, 5182a.
Samos, 5182d.
Samothracian mysteries, 4040b.
Samoveds, 4301d.
Samoyads, 414c, 5369a.
Sampson, William Thomas, 5182d, 5480d.
Sam Slick, 2666d.
Samson, 5183c.
Samuel, 5184a.
*Samuel*, Books of, 5184b.
Samurai, 5184b.
San Angelo, Tex., 5184c.
San Antonio, Tex., 5184d.
San Antonio de Valero Mission, 134b.
San Bernardino, Cal., 5186a.
Sancho Panza, 1841d.
Sand, 5186b.
Sand, George, 5186c.
Sandals, 1861d.
Sandalwood, 5187a.
Sandalwood oil, 5187a.
Sand bur, or bur grass, 5187b.
Sand clams, 1405d.
Sand crickets, 2578a.
Sand dunes, 1881a, 2952b, 5186b.
Sandeau, Jules, 5186d.
Sanderling, 5187b.
Sandhill crane, 1623c.
San Diego, Cal., 5187c.
Sand martin, 3668a.
Sandö Island, 2138c.
San Domingo Republic, 2569d, 5201a.
Sandpiper, 5188b.
Sandstone, 988c, 4886a, 5188c.
Sandusky, O., 5189a.
Sandwich, 5189c.
Sandwich, Ont., 5189c.
Sandwich Islands, 2717a, 5189c.
Sandy Hook, 5189c.
Sandy soil, 5431d.
San Felipe y Santiago de Montevideo, 3929b.
Sanford, Me., 5189d.
San Francisco, 1063d, 5190a.
Sangai, Mount, 249d, 5449d.
Sangster, Charles, 1141c, 5193d.
Sanhedrin, 5194a.
Sanitary science, 5194a.
Sanitation in the Canal Zone, 4474b.
San Jacinto, Battle of, 5194b.
San Joaquin River, 5194c.
San Jose, Cal., 5194d.
San Jose, Costa Rica, 5194c.
San José, Uruguay, 6007a.
San Jose mission, 5185b.
San Jose scale, 5195a.
San Juan, Porto Rico, 4776c, 5195c.
San Juan Bautista, Porto Rico, 4776b.
San Juan del Sur, Nicaragua, 4227c.
San Juan de Ulloa, Mexico, 6055d.
San Juan River, 6011b.
Sankey, Ira D., 3938d.
San Luis Park, 1486a.
San Luis Potosi, Mexico, 5195d.
San Marino, Republic of, 5196a.
San Martin, Jose de, 1335b, 5196c.
San Pablo Bay, 5190a.
San Pedro, Paraguay, 4486b.
San Pedro de Macoris, Santo Domingo, 5201b.
San Salvador Island, 5196d.
Sanskrit language and literature, 5197c.
San Stefano, Treaty of, 5128b.
Santa Anna, Antonio Lopez de, 3763c, 5198a.
Santa Ana, Cal., 5198a.
Santa Barbara, Cal., 5198d.
Santa Barbara mission, 1065b.
Santa Catalina Island, 1222d.
Santa Claus, 1369c, 4230d.
Santa Cruz, Battle of, 4114a.
Santa Cruz, Cal., 5199a.
Santa Fe, N. M., 5199b.
*Santa Maria*, 1502a.
Santa Marta, Mount, 249d.
Santa Maura Island, 3032b.
Santa Monica, Cal., 3504a.
Santee River, 5457b.
Santiago, Battle of, 5200c, 5234c.
Santiago, Chile, 5200a.
Santiago, Santo Domingo, 5201b.
Santiago de Cuba, Cuba, 5200c.
Santiago de Guatemala, Guatemala, 2633b.
Santo Domingo, Republic of, 2569d, 5201a.
Santo Domingo, Santo Domingo, 5202a.
Santos, Brazil, 5202b.
Santos-Dumont, Alberto, 5202c.
Santo Tomas, University of, 4634a.
São Antonio, Brazil, 4588c.
São Francisco River, 5203a.
Saône River, 5203a.
São Paula, Brazil, 5203b.
São Salvador, Brazil, 543c.
Sap, 5203c.
Sapajou, 5204a.
Sapodilla tree, 1320a, 2641a.
Sapphira, 244d.
Sapphire, 2688b, 5204b.
Sappho, 5204c.
Saprophyte fungi, 2349d.
Sapsucker, 5204d.
Sapulpa, Okla., 5205b.
Sapwood, 165b, 5203d.
Saracens, 5205b.
Saragossa, Spain, 5205c.
Saratoff, Russia, 5206d.
Saratoga, Battles of, 2167d, 4988b, 5205d.
Saratoga Springs, N. Y., 5206b.
Saratov, Russia, 5206d.
Sarcolactic acid, 3294a.
Sarcolemma, 4011c.
Sarcophagus, 5207a.
Sardanapalus, 431d.
Sardica (old Roman town), 5430c.
Sardine, 4673c, 5207b.
Sardines anchoisees, 5207b.
Sardinia, Island of, 5207c.
Sardinia, Kingdom of, 5208a.
Sardonyx, 5208c.
Sardow, Victorien, 5208d.
Sarepta, Phoenicia, 4645a.
Sargasso Sea, 5209a.
Sargent, John Singer, 5209a.
Sargon II, 433d.
Sarjektjokko, Mount, 5646a.
Sarnia, Ont., 5209c.
Sarnus River, 4749a.
Sarsaparilla, 5209d.
Sarto, Andrea Del, 5209d.
Sarto, Giuseppe, 4692a.
Saskatchewan, 5210a.
Saskatchewan, University of, 5216b.
Saskatchewan Rebellion, 1125a, 5015d, 5216c.
Saskatchewan River, 5217b.
Saskatoon, Sask., 5218a.
Sassafras, 5218c.
Sassanidae, 4517c.
Satan, 1780b.
Satan's mushroom, 4016b.
Sateens, 5219a.
Satellite, 5218d.
Satellites of Jupiter, 3191c.
Satellites of Mars, 3662b.
Satellites of Saturn, 5220a.
Satellites of Uranus, 6004a.
Satin, 5219a.
Satire, 5219a.
Satolli, Francesco, 5219b.
Satrap, 4595a.
Saturated solution, 5437d.
Saturated steam, 5538c.
Saturation, 2105c, 4921c.
Saturday, 5219c.
Saturn (myth), 5220b, 5819a.
Saturn (planet), 4695c, 5219c.
Saturnalia, 5220c.
Satyr, 5220d.
Saugus, Mass., 5221a.
Sauk Indians, 5136a.
Saul, 3149c, 4529a, 5221a.
Sault (fish), 6273d.
Sault Sainte Marie, Mich., 5221d.
Sault Sainte Marie, Ont., 5221b.
Sault Sainte Marie canals, 5222a.
Saunders, Margaret Marshall, 1143b, 5223b.
Saunders, Richard, 4755a.
Sausage, 5223b.
Savagery, 1398a.
Savaii Island, 5182b.
Savanna, 5223d.
Savannah, Ga., 5224a.
*Savannah*, The, 5354d.
Savannah River, 5225a.
Save River, 5225b.
Savings banks, 5225b.
Savonarola, Girolamo, 5226b.
Savoy, House of, 5227a.
Saw, 5227a.
Sawbills, 3745d.
Sawfish, 5227d.
Sawing lumber, 3533d.
Saw palmetto, 4464c.
Sawtooth Range, 2910c.
Sax, Adolph, 5229b.
Saxe, John Godfrey, 5228a.
Saxhorn, 2836b.
Saxifrage, 5228b.
Saxons, 5228b.
Saxony, Kingdom of, 5228c.
Saxophone, 5229b.
Sayers, Tom, 4830c.
Say's phoebe, 4643c.
Sayward case, 5680a.
Scabies, 5342b.
Scabiosa, 2207a.
Scafell Pike, 2038b.
Scalds, 1012a.
Scale (in music), 4026a, 5229c.
Scale carp, 1102d.
Scale insect, 5229d.
Scalene triangle, 5876a.
Scales, 5230a.
Scallop, 5230b.
Scallop shell, 3879d, 5344a.
Scalp, 5230c.
Scalp ringworm, 5021c.
Scammony, 5230d.
Scandinavia, 5230d.
Scandium, 1295a.
Scapegoat, 5231a.
Scapula, 5399b.
Scarab, 5231a.
Scarf skin, 5400b.
Scarification, 5710d.
Scarlatina, 5231b.
Scarlatti, Alessandro, 4389b.
Scarlet fever, 5231b.
Scarlet ibis, 2901b.
*Scarlet Letter, The*, 5231c.

Scarlet poppy, 4760c.
Scarlet tanager, 5696b.
Scarron, Me., 3607d.
Scaups, 1873b.
Schadow, John G., 5276c.
Schaeffer, Nathan C., 5231d.
Schaffhausen Falls, 4994a.
Scheldt, The, 5232a.
Schenectady, N. Y., 5232b.
Schenley, Mary E., 4688b.
Scheveningen, Holland, 2657c.
Schiller, Johann Christoph Friedrich von, 5232d.
Schilling, Johann, 5233c.
Schism of the West, 285b.
Schleswig-Holstein, 5233c.
Schley, Winfield Scott, 5234b, 5480d.
Schleyer, Johann Martin, 6110b.
Schliemann, Heinrich, 5234d.
Schmalkaldic League, 5235a.
Schmalkaldic War, 4959c.
Schneckenburger, Max, 6119d.
Schneekoppe (mountain), 5016d.
Schnitzer, Edouard, 2026c.
Schnorr Von Carolsfeld, Julius, 5235b.
Schöffer, Peter, 2144a, 2644c.
Schofield, John McAllister, 5235c.
Scholar's mate (chess), 1305b.
Scholastica, Saint, 3883c.
Scholasticism, 5235d.
School, 5236a.
School as a community center, 1517a.
School child, 1324d.
School credits for home work, 5245b.
School equipment for nature study, 4083b.
School fair, 108b.
School garden, 4085a, 5249b.
Schoolhouse in Guatemala, 2633b.
"Schoolmaster in politics," 6300d.
School museums, 1951d.
Schoolroom games, 2374b, 2377a.
Schools, Defects in, 1943b.
Schools, Military, 3800d.
School savings banks, 5226a.
Schools for teachers, 5245b.
Schools of education, 5246b.
Schools of engineering, 2034a.
School system, Gary, 2397d.
School systems, American, 5239a.
School tax, 5713d.
Schooner (ship), 6378d.
Schopenhauer, Arthur, 4604c, 5249c.
Schubert, Franz, 5250a.
Schuckburgh, Richard, 6383c.
Schumann, Robert, 5250b.
Schumann-Heink, Ernestine, 5251a.
Schurman, Jacob Gould, 5251b.
Schurz, Carl, 5251c.
Schuyler, Philip, 5252a.
Schuylkill River, 5252c.
Schuylkill Navigation Company Canal, 1147b.
Schwab, Charles M., 5252c.
Schwartz, Berthold, 2642a.
Schwatka, Frederick, 5252d.
Sciatica neuralgia, 4130c.
*Science and Health, with Key to the Scriptures*, 1368c.
Science and the sciences, 5253a.
Scientific agriculture, 96b.
Scilly Islands, 5254b.
Scimitar, 5666a.
Scio Island, 5254c.
Scion (grafting), 2549b.
Scioto River, 5254d.
Scipio (family), 5255a.
Scissorsbill, 5255b.
Sclera, 2118b.
Scop, 3837b.
Scopas, 5274a.
Scoring in football, 2257b.
Scorpaena miles (fish), 2185b.
Scorpio, 5255c.
Scorpion, 5255d.
Scorpion fly, 5256c.
Scorpion grass, 2267b.
Scotch barley, 593c.
Scotch deerhound, 2625c.
Scotch pine, 4678d.
Scotch terrier, 5256c, 5763b.
Scotland, 5256b.
Scott, Duncan Campbell, 1143c, 5264b.
Scott, Frederick George, 5264b.
Scott, Frederick G., 1143c.
Scott, Hugh Lenox, 5264c.
Scott, Sir Richard William, 5265a.
Scott, Robert Falcon, 4728d, 5265b.
Scott, Thomas, 4955a.
Scott, Sir Walter, 5268c.
Scott, Winfield, 3763c, 4666c, 5269a.
Scotti, Antonio, 5269b.
Scottish Rite, 3681a.
Schottische, 1697b.
Scourge of God, 469a.
Scouring rush, 2844a, 5110b.
Scoutcraft, 884d.
Scout law, 885a.
Scranton, Pa., 5269c.
Screech owl, 4435a.
Screening, 6263d.
Screw, 3714c, 5270a.
Scribe, Augustin Eugene, 5271a.
Scribes, 5271b.
Scrimmage, 2256b.
Scripps League, 430c.
Scrofula, 5271b.
Scruple, 5271c.
Scrying, 1813d.
Scudder, Horace Elisha, 5271c.
Scudo (coin), 1468d.
Sculpin, 5271d.
Sculpture, 5272a.
Scurvy, 5277c.
Scutari, Albania, 5277d.
Scutching, 2206a.
Scylla, 3750d, 4343d, 5278b.
Scythe, 5278b.
Sea anemone, 5278d.
Sea bear, 5281a.
Sea bottom photography, 3986a.
Sea calf, 5283b.
Seacoast floods, 2210c.
Sea cow, 3618d.
Sea cucumber, 5279a.
Sea-devil, 256a, 1780c.
Sea ducks, 1873a.
Sea elephant, 5283b.
Sea flowers, 1462a
Sea gull, 2189d.
Sea horse, 2799a.
Sea-island cotton, 1604c.
Sea kale, 1270c.
Seal (animal), 5280a.
Seal (stamp), 5279c.
Sea lamprey, 3305b.
Sea Lapps, 3322a.
Sea lemon, 5283c.
Sea lilies, 1639d.
Sealing wax, 5283c.
Sea lion, 5282b.
Sealskins, 5282c.
Seals of government, 5279d.
Seance, 5501b.
Sea necklaces, 1524d.
Sea of Japan, Battle of the, 5127b.
Sea otter, 4430a.
Sea parrot, 4865c.
Sea raven, 5271d.
Search, Right of, 5283d.
Searchlight, 1992b.
Search warrant, 6179b.
Sea robin, 2643a.
Sea routes, map, 4336a.
Sea salt, 5175d; origin of, 4333c.
Seasickness, 4089b, 5284b.
Seaside plantain, 4700a.
Seaside sparrow, 5482a.
Seasons, 5284c.
Sea squirts, 5285a
Seaton, Baron, 1469a, 4764b.
Sea tramps, 5355d.
Seattle, Wash., 5285b.
Seat worms, 6360a.
Sea unicorn, 4069d.
Sea urchin, 5287b.
Seaweed, 5287c.
Sebaceous gland, 5400b.
Sebastian, Saint, 5287d.
Sebastiyeh, Asia Minor, 5181a.
Sebastopol, Crimea, 5288a.
Seborrhoea, 1698b.
Secession, 4902b.
Secession, War of, 6144a.
Secret partners, 4519a.
Secret Service, 5289b.
Second (time), 3839a.
Secondary anaemia, 243b.
Secondary batteries, 1981c.
Secondary education, 1942a.
Secondary rainbow, 4923b.
Secondary roots, 5078c.
Second battle of Bull Run, 995c.
Second Crusade, 1652b.
Second degree murder, 4008a.
Second lieutenant, 3408d.
"Second maker of the Constitution," 3664b.
Second partition of Poland, 4724c.
Second Punic War, 5059b.
Second sight, 1224b, 1405b, 1542d.
Second Sikh War, 5380b.
Second War for American Independence, 6140a.
Secord, Laura, 5288b.
Secretary bird, 5288c.
Secretary of State (Canada), 1115d.
Secretary of State (United States), 5535b.
Secretary of State for External Affairs (Canada), 1115d.
Secretary of War, 6138d.
Secretion, 5289c.
Section (in surveying), 3309b.
Section of a grain of wheat, 6263b.
Secunderabad Camp, 2883d.
Sedalia, Mo., 5289d.
Sedan, Battle of, 5290a.
Sedan chair, 1365c.
Sedative, 5290a.
Sedge, 5290c.
Sedgemoor, Battle of, 3892c.
Sedimentary rocks, 2435d.
Sedition Act, 200d.
Seed dispersal, 5292b.
Seeder, 5470d.
Seed leaf tobacco, 5824c.
Seedless apples, 298b.
Seed lobsters, facing 3473.
Seed oysters, 4440b.
Seeds, 5290b.
Seeland, Island of, 6408d.
Segovia River, 2825b.
Seidl, Anton, 5294c.
Seidlitz powders, 5294c.
Seigneurs, 5294d.
Seigniorage, 1467c.
Seigniorial tenure, 5294d.
Seine (net), 4122a.
Seine River, 841b, 5295b.
Seismograph, 5295c.
Seismology, 1906b.
Selah, 5296a.
Selection, 1001b.
Selection of reading matter, 4937c.
Selective draft law, 6174b.
Selectmen, 5296a.
Selector, Telephone, 5740b.
Selenite, 2647b.
Selenium, 1295a.
Seleucides, 3142b.
Seleucus Nicator, 284c.
Self-activity, 3251a, 4547c.
Self-binder, 4945c.
Self-Denying Ordinance, 5296b.
Self-fertilization, 1647a.
Self-poisoning, 511d.
Self-pollinated flowers, 4742d.
*Self Reliance*, 2022b.
Selfridge, Harry J., 5429d.
Self tulips, 5899a.

Seljuks, 5296c.
Selkirk, Alexander, 5296d.
Selkirk, Man., 5296c.
Selkirk, Thomas Douglas, 5297a.
Selkirk Monument, 3177d.
Selkirk Mountains, 933c, 5297c.
Sellwood, Emily, 5756d.
Selma, Ala., 5298a.
Selvage, 1437c.
Selvas, 5298b, 5450c.
Sembrich, Marcella, 5298b.
Semele, 5298c.
Semi-arid region, 345a.
Semicircular canals, 1899c.
Semicolon, Use of, 4871c.
Semidrying oils, 4357c.
Semilunar valves, 2745d.
Seminole Indians, 4364d, 5298c.
Seminole War, 3898b.
Semiramis, 5299a.
Semirelief, 3777c.
Semites, 5299a.
Semitic languages, 5299b.
Semitic races, 4909c.
Semliki River, 163d.
Semnes, Raphael, 5299c.
Sempach, Battle of, 5664a.
Semple, Robert, 5299d.
Sen (coin), 1468d.
Senate, 5300a.
Senators, United States, 1561b.
Seneca, Lucius Annaeus, 5301c.
Seneca Indians, 5301b.
Seneca Lake, 5301d.
Senegal (colony), 5302a.
Senegal River, 5302b.
Senegambia, 5302c.
Senega snakeroot, 5320b.
Senile cataract, 1223d.
Senna, 1217a.
Sennacherib, 5302c.
Sensation, 4583a.
Sense education (Montessori Method), 3920b.
Sense of smell, 5410d.
Sense of taste, 5710b.
Sense of touch, 5848a.
Senses, Development of the, 1322b.
Senses, Special, 5302d.
Senses of birds, 730d.
Sensible perspiration, 4599b.
Sensitive brier, 5303b.
Sensitive plant, 5303a.
Sensory nerves, 4120b.
Sentence, 5303b.
Sentence-building, 2556b.
Sentinel Butte, 4269d.
Seoul, Chosen, 1364d, 5305c.
Separatists, 1536b, 4674b.
Sepia, 5305d.
Sepoy, 5306c.
Sepoy Rebellion, 5305d.
Sepphoris, Galilee, 2783d.
September, 5306b.
Septic, 285d.
Septic tanks, 5322b.
Septime, 2151c.
Septuagint, 704d, 5309a.
Septum, 4290b.
Sequin, Edouard, 3915b.
Sequin River, 4514d.
Sequoia National Park, 4505c, 5309d.
Sequoya, 1299d, 5309b.
Sequoyah (Indian), 5310a.
Seraglio, 5310c.
Serajevo, Bosnia, 844b.
Serapeum, 5310c.
*Serapis*, 3171a, 5310d.
Serbia, 5311a.
Serbs, 5311b.
Serfs, 2158c, 5314a.
Sergeant, 4949a, 5314b.
Sergeant-at-arms, 5314c.
Sergeant-major, 4949a.
Series motor, 1996b.
Serinagur, India, 5314d.
Serous membranes, 3727b.
Serpent, 5419b.
Serpent (in theology), 1780b.
Serpent charming, 5315a.
Serpent mound, 3976a, 4351d.
Serpentine, 5315a.
Serra da Estrella Mountains, 4779d.
Serra de Marão Mountains, 4779d.
Serra do Gerez Mountains, 4779d.
Sertorius, 4750a.
Serum therapy, 5315b.
Serval, 5315c.
Servant-girl problem, 1838d.
Servetus, Michael, 1074d, 5315d.
Servia, 5311c.
Service, Robert William, 1143c, 5316a.
Service pension, 4575a.
Servites, 3732d.
Servius Tullius, 5316c.
Sesame grass, 2371c.
Session (Presbyterian Church), 4809d.
Sestet of a sonnet, 5440b.
Set, 4419c.
Seth, 27c.
Seti I, 5316c.
Set net, 4122c.
Seton, Ernest Thompson, 5316d.
Setter, 5317a.
Setubal, Portugal, 4782c.
Seven Gables, House of, 227d.
Seven modern wonders of the world, 5319a.
Seven Pines, Battle of, 2129d.
Seven Sleepers, 5317b.
Seventeenth Amendment, 1561b.
Seventeenth century dress, 1859a.
Seventeen-year locust, 1376b.
Seventh-Day Adventists, 5317c.
*Seven Times One*, 3319c.
Seventy-five-millimeter gun, 403c.
Seven Weeks' War, 5317d.
Seven wise men of Greece, 5318d.
Seven wonders of the world, 5318d.
Seventy years' captivity, 4757a.
Seven Years' War, 2330a, 5319b.
Severn River (Eng.), 841b, 5320b.
Severn River (Ont.), 4380c.
Severus, Lucius Septimius, 5320b.
Sevier River, 6011c.
Seville, Spain, 5320c.
Sevres, France, 5321b.
Sewage and sewerage, 5321c.
Sewage disposal on farms, 5322c.
Seward, William Henry, 5323b.
Seward glacier, 3484b.
"Seward's Folly," 141c, 3162d.
Sewer pipe, 5321d.
Sewing, 5323d.
Sewing apron, 5325b.
Sewing machine, 5328b.
Sewing-machine needle, 4110a.
Sewing needles, 4109d.
Sex, in population, 4761c.
Sextant, 5329a.
Seymour, Jane, 2771c.
Sforzando, 4022a.
Shackamaxon elm, 4572c.
Shackleton, Sir Ernest, 4729b, 5329b.
Shad, 5329d.
Shaddock, 2575a.
Shade, 1483d.
Shad fly, 3706a.
Shadows, 5330a.
Shafter, William Rufus, 5330c, 5480d.
Shaftesbury, Anthony Ashley Cooper, 5330d.
Shaft of feather, 2144b.
Shagbark hickory bud, 976b.
Shaggy-mane mushroom, 4014d.
Shagreen, 5337c.
Shah Abbas, 4595b.
Shah Jehan, 5331a.
Shahrazad, 311c.
Shahriyar, 311c.
Shah-Zindeh, Mosque of, 5181d.
Shakers, 5331c.
Shakespeare, John, 5332a.
Shakespeare, William, 1509a, 1854c, 5331b, 5857a.
Shakespearean drama in schools, 1855a.
Shakespeare-Bacon controversy, 5335c.
Shakespeare Memorial theater, 5335c.
Shaking delirium, 1750b.
Shaking Quakers, 5331c.
Shale, 5336a.
Shaler, Nathaniel Southgate, 5336a.
*Shall* and *will*, Distinction between, 5757d.
Shalmaneser, 3137a.
Shaman, 2965b.
Shamanism, 5336b.
Shamokin, Pa., 5336b.
Shamrock, 3044b, 5336c.
Shanghai, China, 5336d.
Shannon River, 5337b.
Shans, 1007d.
Shares, 5554b.
Shark, 5337b.
Shark fishing, 5337d.
Sharon, Pa., 5338a.
Sharps, 4022a.
Sharp-shinned hawk, 2724a.
Sharp signatures (music), 4028b.
Sharp-tailed sparrow, 5482a.
Shasta, Mount, 1067b, 5338a.
Shasta daisy, 1001d, 1690c.
Shastina (Crater Peak), 5338b.
Shat-el-Arab, 4596c, 5811d.
Shats, 197b.
Shaughnessy, Thomas George, First Baron, 5338c.
Shaunavon, Sask., 5338c.
Shaw, Albert, 5338d.
Shaw, Anna Howard, 5339a.
Shaw, George Bernard, 5339b.
Shaw, Henry Wheeler, 5339d.
Shawenegan Falls, Que., 5340a.
Shawnee, Okla., 5340b.
Shawnee Indians, 5340a.
Shaw's Garden, 5159a.
Shawtung terrier, 5764a.
Shays' Rebellion, 5340c.
Shearing strength, 5592a.
Sheathing, 1195d.
Sheba, Queen of, 14b, 5436b.
Sheboygan, Wis., 5340c.
Sheep, 5341a.
*Sheep: Spring*, 4453.
Sheep-dog, 1474b.
Sheep laurel, 3200c.
Sheep shank knot, 3270c.
Sheep sorrel, 5443b.
Sheep's wool sponge, 5507a.
Sheep ticks, 5342c.
Sheet bend knot, 3270a.
Sheet lightning, 3429b.
Sheet zinc, 6412a.
Sheffield, Eng., 5342d.
Sheik, 5343a.
Shekel, 5343a.
Shelbyville, Ind., 5343c.
Sheldon, Charles Monroe, 5343c.
Shell (munitions), 5345b.
Shell (of animal), 5343d.
Shell (oyster), 4438d.
Shell (snail), 5419a.
Shellac, 3289c.
Shelldrake, 3745d.
Shelley, Percy Bysshe, 5346b.
Shelter tents, 5758c.
Shem, 5299a, 5347a.
Shemer, Samaria, 5181a.
Shenandoah, Pa., 5347b.
Shenandoah River, 5347b.
Sheol, 2763d.
Shepard, Helen Gould, 2544d.
Shepherd dog, 5347c.
Shepherd kings, 2893b.
*Shepherd of the Pyrenees*, facing 811, 4453.
Sheraton, Thomas, 2355c.
Sherbrooke, Que., 5347c.
Sheridan, Helen, 1875b.
Sheridan, Philip Henry, 5347d.
Sheridan, Richard Brinsley Butler, 5348c.
Sheridan, Wyo., 5348d.

*Sheridan's Ride*, 4936d.
Sheriff, 5349a.
Sheriffe, Lawrence, 5101d.
Sherman, James Schoolcraft, 5349b.
Sherman, John, 5349c.
Sherman, Roger, 5349d.
Sherman, Tex., 5350d.
Sherman, William Tecumseh, 5350a.
Sherman anti-trust law, 1928c, 2698c, 5894a.
Sherman Silver Purchase Act, 1422c, 3570c.
Sherry, 5351b.
Sherwood Forest, 4293d, 5036d.
Shetland Islands, 5351b.
Shetland pony, 2841a.
Shield, 5351d.
Shield system of tunneling, 5901d.
Shiites, 5352b.
Shillaber, Benjamin Penhallow 5352b.
Shilling, 5352c.
Shilluhs, 689c.
Shiloh, Battle of, 5352c.
Shimonoseki, Treaty of, 6365c.
Shin, 5134a.
Shinano River, 3118c.
Shinar, Plain of, 525a.
Shingles, 1196a, 5352d.
Shinney, 2805b.
Shinto, or Shintoism, 5353c.
Ship, 5353b.
Shipboard, 3534c.
Shipherd, John S., 4328d.
Ship Horn Island, 3844b.
Ship money, 5583b.
Ship officers, 4929c.
Ship of the desert, 1078d.
Ship-of-the-line, English, 6183b.
Shipping subsidies, 3741c.
Ships, Protection of, from submarines, 5602d.
Ship stabilizer, 2650c.
Ship under quarantine, 4884d.
Shiraz, Persia, 5357a.
Shire, 5357b.
Shire reeve, 5349a.
Shire River, 4320d, 6407d.
Shirozaemon, Kato, 4056a.
Shitepoke, 2785c.
Shoddy, 63d, 5357b.
Shoepack, 838b.
Shoes, 837c.
Shoestring republic, 1330d.
Shogun, 3122b, 5184b, 5357d.
Sholes, C. L., 5931b.
Shooting, 3654d.
Shooting star, 1620a, 3755a.
Shortages, Mental, 3737a.
Short ballot, 561a, 5358a.
Short-billed marsh wren, 6361d.
Short division, 1818a.
Short-eared owl, 4435a.
Shorthand, 4684d, 5358c.
Shorthorn cattle, 1237b.
Short-horned grasshopper, 2577d.
Short methods in division, 1820d.
Short methods in multiplication, 4001c.
Short session of Congress, 1538c.
Short sight, 4039a.
Short splice, 5503d.
Shortt, Adam, 5360d.
Short-tailed field mouse, 6112c.
Short-tailed shrew, 5364d.
Short-tailed weasel, 6229a.
Short ton, 5833d.
"Short" transactions, 787c.
Shoshonean Indians, 5361a.
Shoshone dam, 1693b.
Shoshone Falls, 2910d.
Shoshone Lake, 6369b.
Shoshoni Indians, 5361b.
Shoshoni War, 4410a.
Shot, 5361c.
Shot, putting the, 5361c.
Shotgun, 5362a.
Shoulder blade, 5399b.
Shovelboard, 5365c.
Shoveler, 5362c.
Shovel-nosed skate, 5397d.
Showy lady's slipper, 3295b.
Shrapnel, 237b, 5362d.
Shrapnel, Henry, 5362d.
Shreveport, La., 5364a.
Shrew, 5364c.
Shrew mouse, 5364d.
Shrike, 5364d.
Shrimp, 5365b.
Shropshire ram, 5341d.
Shrove Tuesday, 3649b, 5365c, 5898a.
Shubenacadie River, 4297a.
Shuffleboard, 5365c.
Shuman process of glass making, 6319d.
Shumar, Babylonia, 532c.
Shumshu Island, 3281c.
Shunt motor, 1996c.
Shuster, William Morgan, 4596a.
Shuttlecock, 627c.
Siam, 5366a.
Siberia, 3889b, 5368b.
Siberian rabbit, 4907a.
Siberian roe, 1739d.
Siberian rubies, 5101a, 5849a.
Sibert, William L., General, 6157a.
Sibyl, 5371b.
Sibylline books, 5371c.
Sicilian foot, 2252c.
Sicilies, Kingdom of the Two, 5371c.
Sicily, 5372b.
Sickle, 5373a.
"Sick Man of Europe," 5914a.
Sickness and injury, Protection from, 3285b.
Siddons, Sarah Kemble, 5373a.
Side drum, 1865d.
Sidereal day, 1715b.
Sidereal month, 3931b.
Sidereal time, 5373b.
Sidereal year, 6385c.
Siderite, 1178c.
Side-saddle flower, 4684c.
Side stroke in swimming, 5657b.
Siding, 1195d, 3534d.
Sidney, Algernon, 5132c.
Sidney, Sir Philip, 5373c.
Sidon, 5373d.
Sidon fortress, 4644b.
Siege, 5374a.
Siege gun, 405d.
Siege gun projectiles, 5346a.
Siege mortar, 405c.
Siegen, Ludvig von, 3777d.
Siege of Petersburg, 4608a.
Siege of Troy, 5888a.
Siege Perilous, 5091b.
Sieges of Yorktown, 6396c.
Siegfried, 4226c.
Sienkiewicz, Henryk, 5375a.
Sierra de Gredos, 5473a.
Sierra de Guadarrama, 5473a.
Sierra Leone colony, 5375b.
Sierra Madre Mountains, 5375c.
Sierra Madre Occidental Mountains, 3767d.
Sierra Morena Mountains, 5473a.
Sierra Nevada de Merida Mountains, 6048b.
Sierra Nevada Mountains, 1057b, 5375c.
Siesta, 1579a.
Siestan Lake, 4595a.
Sieyes, Emmanuel Joseph, 5376a.
Sif, 5796c.
Sifton (family), 5376b.
Sighs, Bridge of, 925b.
Sight, in children, 1323c.
Sight of animals, 260d.
Sigillaria, 5220d.
Sigismund, 5376d.
Signal Corp, 5377a.
Signaling, 5377c.
Signals in football, 2257d.
Signature, in music, 4024b.
Signet ring, 5020c, 5279c.
Signet seal, 4830b.
Sign for the thing signified, 3757d.
Sign language, 5379a.
Sign of the infinitive, 2990b.
Signs and symbols, 188b.
Signs of the zodiac, 6413d.
Sigsbee, Charles Dwight, 5379c.
Sigurd, 5379d.
Sikhs, 5380a.
Si-kiang or Hong-kiang, 5380c.
Silage, 5383d.
Silas, 4529d.
*Silas Marner*, 2011b.
Silence, Towers of, 5851b.
Silent partners, 4519a.
Silent reading, 4939b.
Silenus, 5380c.
Silesia, 5380c.
Silica, 5381a.
Silicon, 5381c.
Silicious tufa, 5898a.
Silicon detector, 6321d.
Silk, 5381b.
Silk, Adulteration of, 63d.
Silk culture, facing 5383.
Silk hats, 2713a.
Silk mill, facing 5382.
Silkworm, 1458b, 5381b.
Silkworm gut, 5383d.
Silkworms and cocoons, facing 5382.
Silky marmoset, 3657c.
Sills, 1193d.
Silo, How to make a, 5384a.
Silo and silage, 5383d.
Silures, 5385b.
Silurian Period, 2440a, 5385b.
Silver, 5385c.
Silver-black fox, 2280b.
Silver certificates, 3887a.
Silver chloride, 5386a.
Silver cochineal, 1454a.
Silver fir, 2178a.
Silver fox, 4819d.
Silver lace, 2529a.
Silver maple, 3643a.
Silver nitrate, 5386a.
Silver pine, 4677d.
Silver rupee, 3886b.
Silver salmon, 5174c.
Silver standard, 3886b.
Silvertip rabbit, 4907a.
Silver values, 720c.
Silvery pompano, 4748d.
Simcoe, John Graves, 5386d.
Simcoe, Lake, 5387a.
Simcoe, Ont., 5386c.
Simile, 5387b.
Simla, India, 2946a, 5387c.
Simmons-Underwood Tariff Act, 5705b, 6303b.
Simms, William Gilmore, 5387d.
Simonides, 5388b.
Simon Peter, 4606b.
Simons, Menno, 3734a.
Simoom, 85a, 5388b.
Simple microscope, 3791b.
Simple pendulum, 4559a.
Simple personal pronouns, 4837c.
Simple predicate, 5303c.
Simple sentence, 5304a.
Simple subject, 5303c.
Simplified spelling, 5491b.
Simplon Pass, 5388c.
Simpson, Sir George, 5388d.
Simpson, Sir James Young, 5389a.
Sims, William Sowden, 5389a.
Sinai, Mount, 5389c.
Sinaitic manuscript of the Septuagint, 5309a.
Sin and punishment, Myths of, 4044a.
Sinclair, Upton [Beall], 5389d.
Sindbad the Sailor, 5038c.
Sindia (family), 5390a.
Sinding, Christian, 5390a.
Sindri (gnome), 2517a.
Singapore, Straits Settlements, 5390b.
Singer, Isaac, 5328d.
Singhalese, 1258a.
Singing, 5390c.
Singing voice, 6109c.

Single-barreled magazine gun, 5362a.
Single-entry bookkeeping, 812a.
Single rhyme, 5004d.
Single tax, 1172d, 5390d.
Sing Sing, N. Y., 4421c, 5392b.
Sinon, 6352b.
Sin Sincks Indians, 4421c.
Sinn Fein, 5392c.
Sinus, 3535c.
Siouan Indians, 5392c.
Siout, Upper Egypt, 5396b.
Sioux City, Ia., 5393b.
Sioux City, S. D., 5393c.
Sioux Indians, 5392d.
Siphon, 5394a.
Siphonaptera, 3001a.
Siphon recorder, 1036d.
Siphuncle, 4090a.
Sir-Daria, 5672a.
Sir Donald, Mount, 5297d.
Siren, 5394c.
Sirens (myth), 5394d.
Sir Galahad, 2360d, 2813c.
*Sir Galahad*, 4453.
Sirius (constellation), 3805c.
Sirius, the dog-star, 5395a.
Sirocco, 197a, 5395a.
Siron, 6061a.
*Sir Roger de Coverley*, 41a.
Sir Sanford, Mount, 5297d.
Sisal, or grass hemp, 5395b.
Sisera, 1724a.
Siskiyou Mountains, 4403b.
Sisters of Charity, 1272d.
Sisters of Mercy, 3744c.
Sistine Chapel, 6040c.
*Sistine Madonna*, 3586b, 4453, facing 4930.
Sisyphus, 5395c.
Sitka, Alaska, 5395d.
Sitka spruce, 5512c.
Sitting Bull, 5396a.
Siut, Upper Egypt, 5396a.
Siva, 5396b.
Siwa, 3124c, 4325d.
Sixpence, 1468d.
Six per cent method, 3011a.
Six-power loan to China, 5682c.
Sixteenth Amendment, 1561b.
Sixteenth century dress, 1859a.
Sixte, 2151c.
Sixth sense, 4012a.
Sixtus (Popes), 5396a.
Sizes of diamonds, 1786b.
Sizes of pins, 4676b.
Sizes of planets, 4695a.
Sizes of stars, 5528c.
Sizes of type, 5930d.
Sizing, 2412a.
Skagerrak, 5396d.
Skagit River, 6187d.
Skaha Lake, 4576c.
Skaldespillir, 4283b.
Skalds, 5397a.
Skat, 5397b.
Skates and skating, 5397d.
Skeat, Walter William, 5398b.
Skee, or ski, 5399d.
Skeena River, 4536c, 5398b.
Skeleton, 5398c.
*Skeleton in Armor*, 4275c.
Skeleton of frog, 2342b.
Skelton, Martha [Wayles], 3130b.
Skepticism, 4641d.
Skerry fence, 5651b.
Skewbac, or skewback, 318c 921a.
Ski, or skee, 5399d.
Skimmer, 5255b.
Skin, 5400a.
Skin gloves, 2513b.
Skin grafting, 5401b.
Skinner, John S., 5532d.
Skinner, Otis, 5401c.
Skipjack, 1428c.
Skirt, 5327b.
Skittles, 870c.
Skoda mortar, 403d.
Skua, 5401c.
Skuld, 4248c.
Skull and crossbones, 5668c.
Skunk, 5401d.
Skupshtina, 5312b.
Sky, 5402b.
Skye, Isle of, 2756c.
Skye terrier, 5402c.
Skylark, 3335b.
Skyrocket, 5042c.
Skyscraper, 1311b.
Slag, 3059c, 5402d.
Slag cement, 1249a.
Slaked lime, 3433d.
Slam (in cards), 924c.
Slander, 3398d, 5403a.
Slang, 5403a.
Slant height of pyramid, 4876d.
Slash pine, 4677d.
Slate, 1911b, 5403d.
Slate pencils, 4558a.
Slater, John Fox, 5405b.
Slater, Samuel, 5800d.
Slater Fund, 5404b.
Slavery, 3401c, 5404c.
Slavonia, 1640d.
Slavonians, 5405d.
Sledge, 5406a.
Sleep, 3412b, 3417c, 5406a.
Sleep habits, 2741c.
Sleeping car, 4867d.
Sleeping porch, 5406c.
Sleeping sickness, 5406c, 5895b.
Sleeplessness, 3003a.
Sleepwalking, 5439d, 5598b.
Sleight-of-hand, 1541c.
Slidell, John, 3679d.
Slide Mountain, 1231d, 4195b.
Slides, Stereoptican, 5549a.
Sliding avalanche, 519a.
Sliding valve, 6025d.
Slime mold, 2350a, 5406d.
Sling, 5407a.
Slingers, War of the, 2343a.
Sling fruits, 5292d.
Slingshot, 1223b, 5407c.
Slip noose, 3270b.
Slipperwort, 5407d.
Slippery elm, 2017a.
Slivers, 5499d.
Sloane, Sir Hans, 944d.
Slocum, Frances, 6285a.
Sloe, 5407d.
Sloth, 5408a.
Slot machine, 5408b.
Slovaks, 5408d.
Slow children, 3738b.
Slow lemur, 3502d.
Sloyd, 5409a.
Slug, 5409a.
Slur (in music), 4025b.
Sluys, Battle of, 4629b.
Smaland Uplands, 5646b.
Small arms, 5409b.
Small intestine, 3024a.
Small-leaved myrtle, 4040a.
Small pica type, 5930d.
Smallpox, 5410a.
Smalt, 1451a.
Smell, 1322d, 5410c.
Smell, in animals, 261c.
Smelling salts, 5411a.
Smelt, 5411a.
Smet, Peter John de, 5411b.
Smetana, Friedrich, 5411c.
Smilax, 5411c.
Smiles, Samuel, 5411d.
Smith, Adam, 5412a.
Smith, Donald Alexander (Canada), 5586b.
Smith, Edmund Kirby, 5412b.
Smith, Francis Hopkinson, 5412c.
Smith, Goldwin, 5413a.
Smith, Sir Henry, 3294d.
Smith, Hoke, 5413c.
Smith, Hyrum, 3951d, 5415b.
Smith, John, 850d, 5413c.
Smith, Joseph, 3950b, 5414b.
Smith, Samuel Francis, 5415c.
Smith, Sydney, 5415d.
Smith College, 5416a.
Smith Falls, Ont., 5416b.
Smith-Hughes law, 5242b.
Smithson, James, 5416d.
Smithsonian Institution, 4739c, 5416b.
Smithsonite, 6411d.
Smock, 5327a.
Smoke, 5417a.
Smokeball mushroom, 4014c.
Smoke bombs, 5603b.
Smokeless powder, 5417b.
"Smoky City," 4688a.
Smoky River, 4537c.
Smollett, Tobias George, 5417c.
Smooth-leaved sumac, 5622b.
Smooth-seeded pea, 4534a.
Smooth spinach, 5499b.
Smuggling, 5417d.
Smuts, 5418a.
Smyrna, Turkey, 5418b.
Smyrna fig, 2168c.
Smyrna rug, 1199d.
Snail, 5418c.
Snake (reptile), 5419b.
Snakebird, 6364d.
Snake bite, 4721d.
Snake charming, 5315a.
Snake dance, 5419d.
Snake gourd, 2545d.
Snake Indians, 5361b.
Snake killer, 5027d.
Snake River, 2911d, 5420a.
Snake River canyon, 4404a.
Snakeroot, 5420b.
Snapdragon, 5420b.
Snap judgments, 4946b.
Snapping turtle, 5920b.
Snare drum, 1865d.
Snath, 5278c.
Snipe, 5420c.
Snoring, 5421a.
Snorri Sturluson, 5421b.
Snout beetle, 1672a.
Snow, 5421c.
Snowball, or guelder-rose, 5422a.
Snowbird, 999b, 3185d.
*Snowbound*, 230a.
Snow bunting, 999b, 5422b.
Snowdon, Mount, 6124b.
Snowdrop, 5422b.
Snow flake (bird), 5422b.
Snowflakes, 5421c.
Snow Lake, 3932b.
Snow leopard, 1220c, 4431c.
Snow line, 5422d.
Snow load, 986d.
Snowplow, 5422d.
Snowshoe, 5423a.
Snowy heron, 2784b.
Snowy owl, 4435a.
Snowy Range, 1057b.
Snuff, 5423d.
Snyders, Franz, 4454a.
Soap, 5424a.
Soapstone, 5541c.
Soar River, 3372a.
Soccer football, 2260a.
Sociable weaver bird, 6332d.
Social bee, 648c.
Social clubs for women, 6349a.
Social Democrats, 5424c.
Social environment, 2061b.
Social ethics, 5428c.
Social insects, 2999b.
Socialism, 245a, 5425a.
Social letters, 3389a.
Social psychology, 5428c.
Social settlement, 5426c.
Social technology, 5428a.
Social War, 5059d.
Societies for children, 1327c.
Society, How to organize a, 4509b.
Society for the Prevention of Cruelty to Animals, 1650b.
Society Islands, 5427a.
Society of Friends, 4883c.
Society of Jesus, 3143c.
Society of Psychical Research, 5501c.
Society of the Cincinnati, 1382b.
Sociology, 5427c.
Sockeye, 936a.
Socrates, 5428b.
Soda, 5429b.

Soda saltpeter, 5178d.
Soda water, 5429c.
Sodium, 5429d.
Sodium arsenate, 5430a.
Sodium bicarbonate, 5429b.
Sodium hydroxide, 5429c.
Sodom, 5430a.
Sodom, Apples of, 5430a.
Soerabaya, Java, 5640a.
Soerakarta, Java, 5640b.
Sofia, Bulgaria, 5430b.
Soft corn, 1585d, 1592c.
Soft palate, 3981c, 4457a.
Soft-shell clams, 1405d.
Soft-shell crab, 1621a.
Soft-shell turtle, 5920c.
Soft solders, 5433d.
Soft water, 6213d.
Soft wheat, 6262a
Sogne Fiord, 2177c.
Soil, 2156a, 5430c.
Soil roots, 5078c.
Soils, Bureau of, 106b.
Sokoto, Nigeria, 5432b.
Sol (coin), 1468d.
Solano, 5473d.
Solano, Father, 4487d.
Solanum, 5432c.
Solar energy, 2032a.
Solar engine, or sun motor, 5432c.
Solar microscope, 5432d.
Solar month, 3931b.
Solar photography, 5626a.
Solar plexus, 875b, 4121b.
Solar spectrum, 5488d.
Solar system, 5433a.
Solar time, 5523d.
Solar zones, 6415b.
Solder, 5433c.
Solder paste, 2986c.
Soldiers' homes, 5433d.
Soldiers of the navy, 3652b.
Soldo, 1468d.
Sole, 5434b.
Solemn high mass, 3682c.
Solemn League and Covenant, 1616d.
Solicitor, 601d.
Solicitor of the Treasury, 5867d.
Solid, 5434b.
Solid geometry, 2444b.
Solid gold, 2523c.
Solids, Molecular force in, 3878b.
"Solid South," 3961a, 4977b.
Solis, Diaz de, 4701b.
Solis, Juan de, 6008d.
Solitaire, 5434c.
Solitary bees, 656a.
Solitary gentian, 2420c.
*Solitude of the Soul*, 5678d.
Solo, Java, 5640b.
Solomon, 1710a, 5434d.
Solomon Islands, 2169d, 5436d.
Solomon's Song, 5437a.
Solomon's Temple, 5435c 5746a.
Solon, 5318d, 5437b.
Solstice, 5437c.
Solution, 5437d.
Solway Firth, 5438a.
Solyman II, or Solyman the Magnificent, 5438b, 5912b.
Somali Coast, 5438c.
Somaliland Protectorate, 5438d.
Somers Islands, 697a.
Somerville, Mass., 5439a.
Somerville, Me., 3979c.
Somma, Mount, 6073c.
Somme, Battle of the, 5439b, 6161b.
Somme River, 5439b.
Somnambulism, 5439d.
Somnus, 3954d, 5440a.
Songkoi River, 2685d.
*Song for the South*, 4546d.
Song of birds, 731c.
Song of Deborah, 2755d.
Song of Lamech, 2755d.
Song of Songs, 5437a.
*Song of the Chattahoochee*, 2456d.
*Song of the Lark*, 4453; facing 917; analysis of, 4447d.
Song of the Well, 2755d.
Song sparrow, 5481d.
*Song to the Oak*, 4322d.
Sonnet, 5440b.
Son of Heaven, 3795a.
Sons of Daniel Boone, 884b.
Sons of Liberty, 4984d, 5440d.
Sons of Veterans, 5441a.
Soo Canals, 5222b.
Soot, 5441b.
Sophia (Russia), 4606c.
Sophists, 4641d, 5441b.
Sophocles, 5441c.
Soprano, 5390d.
Sor, Ferdinand, 2638d.
Sora rail, 4915c.
Sorbonne, 5442b.
Sorel, Que., 5442c.
Sorel River, 5011b.
Sorghum, 5442d.
Sorority, 5442d.
Sorosis Club, 6349d.
Sorrel, 5443b.
Sorrel tree, or sourwood, 5443b.
Sothern, Edward Hugh, 5443c.
Sou, 2293d.
Soudan, 5611c.
Soufriere, Mount, 2630a, 5168b.
Soul, Transmigration of the, 5860b.
Soulanges Canal, 1147b.
Soulé, Pierre, 4422b.
Sound, 5443d.
Sound dues, 4670a.
Sounding, 5446b.
Sounding balloons, 559d.
Sounding lead, 3356c.
Soups, How to can, 2250c.
Souris, Man., 5446c.
Souris, P. E. I., 5446d.
Souris River, 4270a.
Sour milk, 3894a.
Sourwood, 5443b.
Sousa, John Philip, 5446d.
South Africa, Union of, 5941a.
South African War, 5447c.
South America, 4251d, 5448b.
South American ostrich, 4991b.
South American tapioca, 5700d.
Southampton, Eng., 5453c.
South Australia, 5454a.
South Battery, Fort, 2548b.
South Bend, Ind., 5455a.
South Bethlehem, Pa., 5455c.
Southbridge, Mass., 5455c.
South Carolina, 5455b, 6145c.
South Carolina, Universty of, 5462d.
South China peach, 4538c.
South China Sea, 1355b.
South Dakota, 5463a.
South Dakota, University of, 5469b.
Southdown sheep, 5341d.
Southeast trade winds, 6309d.
South equatorial current, 4335a.
Southern Cross, 5469b.
Southern pine, 4677c.
Southern Rhodesia, 5002a.
Southern staghound, 5521a.
Southey, Robert, 5469c.
South frigid zone, 6415d.
South Georgia, 4729d.
South Georgia Island, 2132a.
South Omaha, Neb., 5470a.
South Orkney Islands, 2132a.
South Platte River, 1486d, 4704a.
South Pole, Discovery of the, 4728a.
South Saskatchewan River, 5217d.
South Sea Company, 5470a.
South Sharon, Pa., 2139b.
South Shetland Islands, 2132a.
South temperate zone, 6415c.
South Victoria Land, 276d.
Southwest Africa Protectorate, 2466b.
Southwestern Indians, 2963b.
Sovereign (coin), 5470b.
*Sovereign of the Seas*, 5356b, 6182a.
Sovereignty, 5470c.
*Sower, The*, 4453.
Sowing machine, or seeder, or drill, 5470d.
Sow thistle, 5471c.
Soy bean, 634c.
Spaghetti, 3549b.
Spahee, 5306c.
Spain, 5471b, 5479d.
Spain, Flag of, 2199c.
Spalding, John Lancaster, 5479b.
Span, of arch, 318d.
Spaniel, 5479c.
Spanish accent, 4840d.
Spanish-American War, 3571c, 2532c, 5479d.
Spanish bayonet, color plate, facing 2224.
Spanish cow, 1234c
Spanish Guinea, 5476b.
Spanish main, 4094b.
Spanish national hymn, 2894a.
Spanish peach, 4538c.
Spanish peanut, 4540d.
Spanish plow, Early, 4709a.
Spanish Succession, War of the, 2329d, 5609b.
Span of life, 4761b.
Spar buoy, 1000c.
Spareribs, 4763d.
Spark coil, 6323b.
Sparks, Jared, 5481b.
Sparrow, 5481c.
Sparrow hawk, 5482b.
Sparta, or Lacedaemon, 5482b.
Spartacus, 5483d.
Spartanburg, S. C., 5484a.
Spartan training, 5482d.
Spasm, 5484b.
Spasmodic croup, 1647d.
Spatulate leaf, 3361c.
Spavin, 5484c.
Spawn, 5484d.
Spawning of cod, 1459a.
Speaker, 5485a.
Speaking voice, 6109c.
Spear, 5486a.
Spearmint, 3838b, 4579a, 5486c.
Special endorsement, 4111c.
Special mail delivery, 4791b.
Special power of attorney, 4803d.
Special schools, 5245b.
Special sensations, 5303a.
Special senses of animals, 260c.
Special session of Congress, 1538c.
Specie Circular, Jackson's, 3098a, 6283d.
Specie payments, Resumption of, 5486d.
Species, 1409d, 5487c.
Specific duties, 1677c.
Specific gravity, How to find, 2579c.
Specific legacies, 3370c.
Specific lien, 3408d.
Specific trade-mark, 5855c.
Spectacled bear, 5487d.
Spectacled snake, 1452c.
Spectacles, 5487d.
*Spectator*, 41a.
Spectrograph, 442d.
Spectroscope, 5488b.
Spectrum, 1482b, 3425a.
Spectrum analysis, 5488d.
Specular iron, 2766a.
Specular metal, 950b.
Speech, 5489c.
Speed of light, 3423a.
Speed of sound, 5446a.
Speedometer, or cyclometer, 5489d.
Speed records of horses, 4908d.
Speed River, 2634c.
*Speedwell*, 3705a, 4713d.
Speke, John Hanning, 5490a.
Spelling, 5490b.
Spelling reform, 5491a.
Spelling reform in Canada, 5492a.
Spelter, 6411d.
Spelter solder, 897c.

Spelt wheat, 6262b.
Spencer, Herbert (philosopher), 2108d, 5492d.
Spencer, John F., 298b.
Spenser, Edmund, 5493d.
Spenserian stanza, 5494c.
Spermaceti, 5494c.
Spermatophytes, 862a.
Sperm candle, 4651b.
Sperm oil, 6260c.
Sperm whale, 222d, 6260c.
Sphalerite, 6411d.
Sphenoid, 2738d.
Sphere, 5494d.
Spherical trigonometry, 5879b.
Spheroid, 5495c.
Sphinx, 5495c.
Sphinx moth, 5496b.
Spica, 443d.
*Spica Virginis*, 6101d.
Spice, 5496c.
Spice Islands, 3881b.
Spices, Adulteration of, 63a.
Spicules, 5506c.
Spider, 5497a.
Spider monkey, 3891d, 5204b.
Spider web, 5498d.
Spikenard, or nard, 5498d.
Spinach, 5499a.
Spinal anesthesia, 253d.
Spinal cord, 4120b, 5499b.
Spinal meningitis, 3733b.
Spinal nerves, 4120c.
"Spindle City," 1466c.
Spineless cactus, 1039c.
Spinel rubies, 5101a.
Spinning, 5499b.
Spinning jenny, 5499d.
Spinning wheel, 5500a.
Spinoza, Baruch [Benedict], 5500b.
Spiny ant-eater, 1913d.
Spiraea, 5500d.
Spiral inclined plane, 5270b.
Spire, 5501a.
Spirea, 919d.
Spires, Diet of, 4846d.
Spirillum, 537d.
Spirit duck, 2599d.
Spirit level, 3391d.
Spirit of hartshorn, 2708c.
*Spirit of '76*, 4453.
*Spirit of the Great Lakes*, 1311a, 2279a.
Spirits of hartshorn, 236c.
Spirits of turpentine, 5919b.
Spiritualism, 3723a, 5501b.
Spiritual peers, 4550b.
Spirit varnishes, 6038b.
Spirometer, 5502d.
Spit, The, 5503a.
Spithead, 5503a.
Spitting snake, 424c.
Spitz, or Pomeranian dog, 5503a.
Spitzbergen, 5503b.
Spleen, 7c, facing 1388, 3237c, 5503c.
Splenic fever, 280a.
Splice grafting, 2551c.
Splicing, 5503d.
Split infinitive, 2990c.
Spofford, Ainsworth Rand, 5504b.
Spoils system, 1403d, 3096a, 5504b.
Spokane, Wash., 5504c.
Spoliation, 1564b.
Sponge, 5505c.
Sponge (yeast), 6386a.
Spontaneous combustion, 1508d.
Spontaneous generation, or abiogenesis, 5507d.
Spoonbill, 5507d.
Spoonbill cats, 4443b.
*Spoon River Anthology*, 3692d.
Sporangium, 3876d.
Spore, 5508a.
Spotted alder, 6342a.
Spotted fever, 5932d.
Spotted salamander, 5169c.
Spotted wintergreen, 6318b.
Spottiswood, Lady John Scott, 266b.
Spottsylvania Court House, Battle of, 5508b.
Sprain, 5508b.
Sprat, 5508c.
Spreadeagleism, 3152b.
Spree, 5508c.
Spreewald, 5508d.
*Spring*, 4453.
Spring (elastic body), 5509b.
Spring (water), 5508d.
Spring balance, 547a, 5509c.
Springbok, or springbuck, 5509c.
Spring clocks, 1436a.
Springer, 318c.
Springfield, Ill., 5510a.
Springfield, Mass., 5510c.
Springfield, Mo., 5511a.
Springfield, O., 5511b.
Springfield rifle, 5017c, 5409d.
Spring governor, 2547c.
Spring Hill, N. S., 5511d.
Springing beetle, 1428c.
Spring stories, 5566a.
Spring tide, 5808c.
Spring vetch, 6074b.
Spring wheat, 6262c.
Sproule, Thomas Simpson, 5511d.
Sprouting, 2482c.
Spruce, 5512a.
Spurge family, or Euphorbiceae, 5512c.
Spruce grouse, 2629a.
Spruce Knob, 6252d.
Spruce partridge, 4519b.
Spruce Wood Forest Reserve, 3628b.
Spur gearing, 2410c.
Spurgeon, Charles Haddon, 5512d.
Spurzheim, Johann G., 4651c.
Spuyten Duyvil Creek, 4206a.
Spy, 5513a.
Spy-Wednesday, 2815d.
Squad, 380b.
Squadron, 380b, 5513c, 5678a.
Square, 5513c.
Square knot, 3270c.
Square measure, 5514a.
Square meter, 3759a.
Square root, 5514a.
Square root of decimal numbers, 5515d.
Squash, 5516b.
Squash bug, 5516c.
Squatter, 2971c, 5517b.
Squatter sovereignty, or popular sovereignty, 5516d, 6382b.
Squaw mint, 4574b.
Squid, 5517b.
Squill, 5517c.
Squinting, or strabismus, 5517d.
Squire, 1358a.
Squirrel, 5518a.
Squirreltail grass, 6283b.
Sraosha, 2184c.
Srbija, 5313b.
Sredec, 5430b.
Srinagar, India, 5314d.
Stabilizer for aëroplane, 2650c.
Stable equilibrium, 2579b.
Stabroek, British Guiana, 2452b.
Stacks, 5259b.
Stadacona, 4894b.
Stadium, 454a, 5518d.
Stadtholder, 5519b.
Staël-Holstein, Anne Louise Germaine, 5519b.
Staff, 2115d.
Staff (building), 2115d, 5520c.
Staff (military), 5519d.
Staff (music), 4022c.
Staffa, Island of, 2175a.
Staff degrees (music), 4022d.
Stag, 5520c.
Stag beetle, 5520d.
Stag-bush, 759a.
Stage coach, 4919a.
Staghorn, 5621d.
Staghound, 5521a.
Stained glass, 5521a.
Staked Plain, 4172b.
Stake-driver, 754c.
Stalactites and stalagmites, 1241c, 5521c.
Stalwarts, 2390d.
Stamboul, 1556c.
Stamens, 2223d.
Stamford, Conn., 5521c.
Stamford Bridge, Battle of, 2692c.
Stammering, 5521d.
Stamp, 5522b.
Stamp Act, 4984b, 5522c.
Stamp Act Congress, 4984c.
Stamp collecting, 4788a.
Stamps, Rare, 4788b.
Stamp weed, 2961c.
Standard coins, 1467b.
Standard-gauge railroads, 4918d.
Standardization of public schools, 5239d.
Standard moneys, Table of, 3887d.
Standard Oil Company, 5051a, 5523a.
Standards, Bureau of, 1512c.
Standard scale of harness, 2688b.
Standard time, 5523d.
Standerat, 5662b.
Standing Rock Reservation, 5463b.
Standish, Miles, 1616a, 3705c, 5524b.
Standish, Rose, 1616a.
Standpipes, 4978c.
Stand Rock, 6331c.
*Stand Up, Stand Up for Jesus*, 2896a.
Stanford, Leland, 5524d.
Stanley, Falkland Islands, 2132a.
Stanley, Frederick A. 1773c.
Stanley, Henry M., 88a, 3469c, 5525b.
Stanley Pool, 1535d.
Stanovoi Mountains, 5526b.
Stanton, Edwin McMasters, 5526c.
Stanton, Elizabeth Cady, 5527a.
Stanton, Frank Lebby, 5527c.
Stanwix, Fort, 2195b.
Stapes, 1898d.
Star, 5528a.
Star, How to make a, 5529a.
Starch, 5529d.
Star Chamber, 5531a.
Starch indigestion, 2741b.
Starch-making leaf, 5529d.
Starch's standard of handwriting, 1937a.
Starfish, 5531b.
Star grass, 220c.
Stark, John, 5531d.
Starkenburg, Hesse, 2788b.
Starling, 5532a.
Star-nosed mole, 3877c.
Star of Bethlehem, 5532b.
Starosta, 5118d.
Starr, Ellen, 2867d.
Star route, 5532b.
Star route frauds, 5532c.
Stars, 4695b.
Stars, Names of, 443b.
*Star-Spangled Banner, The*, 3234a, 5532d.
Starvation, 2140a.
Starved Rock, 2926b, 3337d, 5534a.
Stassfurt, Germany, 4793a.
State, 5534a.
State, Department of, 5535a.
State census, 1250d.
State civil service, 1403c.
State department of public instruction, 5239c.
State Educational Building, New York, 4201b.
State flags, color plates facing 5976.
State flowers, 2227c.
State House, Boston, 2493d.
State house of representatives, 4974b.
State in Schuylkill Club, 4624d.

State judicial systems, 1615a.
Staten Generaal, 4126a.
Staten Island, 5535d.
State organizations in world, facing 2546.
State quarantine, 4884d.
States, Breadth of, 5973c.
States, Length of, 5973a.
States-General, 5536a.
States of the Church, 4479b.
States' rights, 1054d, 2735d, 4309c, 5536b.
State universities, 6001b.
Statics, 3714d, 5536c.
Statthalter, 213d.
Statuary bronze, 950b.
Statuary Hall, 5536c, 6195b.
Statue of Liberty, 3400a.
*Status quo*, 5868b.
Statute law, 3349d, 5537b.
Statute of limitations, 1724d.
Staubbach Falls, 5659d, 6216a.
Stauffen, Frederick of, 2807b.
Staunton, Va., 5537b.
Stavanger, Norway, 5537d.
Stead, William Thomas, 5538a.
Steady wind, 6310b.
Steam, 5538b.
Steamboat Inspection Service, 1512c.
Steam coal, 1443b.
Steam engine, 5538d.
Steam hammer, 5541a.
Steam heat, 2752a.
Steam locomotive, 3477c.
Steamship, 5353b.
Steam shovel, 5541b.
Steam tractor, 5854b.
Steam turbine, 5905a.
Steam yacht, 6378d.
Steapsin, 4477a.
Stearic acid, 5541c.
Stearin, 5541c.
Stearin candles, 1457d.
Steatite, 5541c.
Stedman, Edmund Clarence, 5541d.
Steel, 5542a.
"Steel City," 4687b.
Steele, Sir Richard, 5543a.
Steelhead, 5174d.
Steel pens, 4556c.
Steelton, Pa., 5543c.
Steelyard, 5543c.
Steen, Jan, 4454b, 5543d.
Steenbock, 278d, 2901a, 5544d.
Steever, Edgar Z., 3800c.
Stefansson, Vilhjalmur, 5544a.
*Stegomyia calopus*, 6387a.
*Stegomyia* mosquito, 3967d.
Stein, Heinrich Friedrich Karl, 5544b.
Steinbok, 278d, 2901a, 5544d.
Steins Mountains, 4403c.
"Stella," 5655c.
Stellarton, N. S., 5545a.
Steller sea lion, 5283a.
Stem, 5545b.
Stemless loco, 3481a.
Stencil, 5546d.
Stengel, Wilhelm, 5298b.
Stheno, 3723a.
Step cut (diamond), 2413b.
Stephen (king of England), 5546d.
Stephen II (Pope), 4479b.
Stephen, Mount, 4507a.
Stephens, Alexander Hamilton, 5547a, 6146a.
Stephenson (family), 5547c.
Stephenson's first locomotive, 4919d.
Steppes, 5548b.
Stere, 3759a.
Stereopticon, 5548b.
Stereoscope, 5549b.
Stereoscopic camera, 1081a.
Stereotyping, 5549c.
Sterilization of milk, 3803c.
Sterlet, 5596a.
Sterling silver, 5386a.
Sternberg, George Miller, 3967d.
Sterne, Laurence, 5550a.
Sternum, 5399d.
Sterope, 4707a.
Stethoscope, 5550b.
Stettin, Prussia, 5550c.
Stettler, Alta., 5550d.
Steuben, Frederick William Augustus, 5551a.
Steubenville, O., 5551a.
Stevens, Alfred, 5276d.
Stevens, Lillian M. N., 4771b.
Stevens, Thaddeus, 5551b.
Stevenson, Adlai Ewing, 5551c.
Stevenson, Robert, 5551d.
Stevenson, Robert Louis, 5182b, 5552a.
Stewart, Philo, 4328d.
Stibnite, 284c.
Stick, Printer's, 4823c.
Stick button, 1002b.
Stick laying for kindergartens, 3244a.
Stickleback, 5553a.
Stickseed, 5553c.
Stiff neck, 4993b.
Stigma, 2224b.
Stikine River, 5553c.
Still, 1809a.
Still, Andrew Taylor, 4422b.
Stillwater, Battle of, 5206a.
Stillwater, Minn., 5553c.
Stilt, 5553d.
Stilts, 5554a.
Sting Ray, 5554a.
Sting tongue, 4816a.
Stinkhorn mushroom, 2350a, 4016b.
Stinkweed, 5584b.
Stirling Range, 6247c.
Stoat, 2073a.
Stock (grafting), 2549b.
Stock, Capital, 5554a.
Stockbridge Indians, 3875d.
Stock brokers, 949a.
Stock certificate, 5554b.
Stock Exchange, 5555a.
Stockholder, 5554b.
Stockholm, Sweden, 5556b.
Stockholm system, 4835c.
Stocks, 4674c.
Stock ticker, 3028b, 5735d.
Stockton, Cal., 5557b.
Stockton, Francis Richard, 5556d.
Stoddard, Richard Henry, 5557d.
Stogies, 4689d.
Stoicism, 5558a.
Stoic School of Philosophy, 4641d.
Stoke-upon-Trent, Eng., 5873a.
Stola, 5558b.
Stomach, 7c, 201b, 5558b.
Stomachic tonics, 5834d.
Stomach sweetbread, 5652c.
Stomata, 3362a.
Stone, 988c, 5040c.
Stone, Durability of, 988c.
Stone, Ellen, 571d.
Stone, Nicholas, 5276d.
Stone Age, 5559a.
Stonechat, 5559c.
"Stone City," 645d.
Stone crab, 1621a.
Stone for building, 988a.
Stonehenge, 5559d.
Stone lobster, 2782d.
Stone marten, 3667a.
Stone mill, Newport, R. I., 4181b.
Stone mint, 3838b.
Stone Mountain, 5560b.
Stone needle, 4110a.
Stone of destiny, 1593d.
Stone of Scone, 6250a.
Stone of Tibur, 5866a.
Stone pavement, 5029b.
Stone pine, 4678d.
Stoner, Winifred Sackville, 5561a.
Stone River, Battle of, 4008b.
Stonewall, Man., 5561b.
"Stonewall" Jackson, 1267b, 3099d.
Stoneware, 4798a.
Stony Point, N. Y., 5561b.
Stop order, 3888d.
Stop watches, 6212d.
Storage battery, 5561c.
Storer, Mrs. Bellamy, 5067d.
Store Skagastölstind, 4283d.
Stories to tell, 5566a.
Stork, 5562b.
Stormy petrel, 4611a.
Storms, 5562d.
Storthing, 4288a.
Story, Emma Hayden, 1898b.
Story, Joseph, 5563c.
Story, William Wetmore, 5277a.
*Story of Cotton*, 1603d.
*Story of Frithjof, The*, 5730c.
Story-telling, 5564a.
Stoss, Veit, 5581b.
Stout, 659a.
Stove, 5581b.
Stowe, Harriet Elizabeth Beecher, 5581d.
Strabismus, 5517d.
Strabo, 5582a.
*Stracci feracci*, 2488c.
Strachan, John, 5582b.
Stradivarius, Antonio, 5582d.
Strafford, Thomas Wentworth, 5583a.
Straight angle, 255d.
"Straight Tongue," 6267d.
Strain, 5508b.
Strait of Messina, 3750c.
Strait of Tartary, 5168d.
Straits Settlements, 5583d.
Strakosch, Maurice, 4528a.
Stramonium, 5584b.
Strand, London, 3489c.
Strangulation, 2783b.
Strass, 2413d.
Strassburg, Alsace - Lorraine, 5584b.
Strassburg clock, 5584d.
Strategy, 5585b, 5677b.
Stratford, Ont., 5585c.
Stratford-on-Avon, Eng., 5585d.
Strathcona and Mount Royal, Donald Alexander Smith, 5586a.
Strathcona Horse, 5587d.
Stratified rocks, 5588b.
Stratus cloud, 1438c.
Straus, Oscar Solomon, 5588c.
Straus, Simon W. 5801d.
Strauss, David Friedrich, 5588d.
Strauss, Johann, 5589a.
Strauss, Richard, 5589b.
Straw, 5590a.
Strawberry, 5590b.
Strawberry enemies, 5591b.
Strawberry guava, 2634a.
Strawberry tree, 317b.
Straw hats, 2713b.
Straw itch, 3087a.
Straw paper, 4480d.
Straw plait, 5590a.
Streator, Ill., 5591c.
Street, 5028a.
Street called Straight, 1693d, 5908d.
Strength of materials, 5591d.
Strength of ropes, 5078b.
*Streptococci*, 537d.
Striated muscle, 4011c.
Strickland, Agnes, 3938c.
Strickland, Elizabeth, 3938c.
Strict constructionists, 5981b.
Strike, 5592c.
Strike the flag, 2194c.
Striking clocks, 1436b.
Strindberg, August, 5592d.
Stringer, Arthur, 1143b, 5593b.
Striped mullet, 3998a.
Striped skunk, 5402a.
Stromboli, Mount, 6111b.
Stromness, Orkney Islands, 4414a.
Strömö Island, 2138c.
Strongbow, 3050c.
Strong verbs, 6056d.
Strontium, 5593b.

Strontium hydroxide, 5593c.
Struck coins, 4311c.
Structural botany, 3955a.
Structural designs, 2985a.
Structural material in the United States, 5954c.
Struggle for existence, 859d, 4080d.
Strychnine, 282c, 5593c.
*Strychnos nux vomica*, 4320b.
Stuart, Charles Edward, 5593d.
Stuart, Gilbert, 5593d.
Stuart, James Ewell Brown, 5594c.
Stuart Dynasty, 2046c, 5594b.
Stucco, 5594d.
Studs, 1194b.
Study by outlines, 2431b.
Study of birds, 733b.
Study of reading, 4940b.
Study of trees, 5871a.
Study topics for—
April, 302b.
August, 473b.
December, 1728b.
February, 2147b.
January, 3112b.
July, 3133b.
June, 3186b.
March, 3646b.
May, 3702b.
November, 4306b.
October, 4388b.
September, 5307b.
Sturgeon, 5595c.
Sturgeon Bay and Lake Michigan Canal, 1147b.
Stürm, Johannes, 5596b.
Stuttering, 5521d.
Stuttgart, Germany, 5596b.
Stuyvesant, Peter, 5596c.
Style, 2224b.
Stylet, 3966c.
Stylites, Saint Simeon, 3883c.
Stylographic pen, 4557a.
Stylus, 4556b.
Symphalus, Lake, 2780b.
Styptic, 5597b.
Styx, 1281d, 5597c.
Suakin, Egypt, 4308d.
Subclavian artery, 391a, facing 1388.
Subclavian vein, facing 1388.
Subconscious, The, 5597c.
Sub-contractor, 986a.
Subhadra, 3180d.
Subject (government), 3191a.
Subject (grammar), 5303c.
Subjective mind, 5737a.
Subjunctive mode, 3870b.
Sublimate, 5600c.
Sublimation, 5600c.
Submarine, 2808d, 5600c, 6169b.
Submarine cable, 1036a.
Submarine chasers, 4097d.
Submarine mine, 5604b.
Submetallic minerals, 3816d.
Subordinate conjunctions, 1540c.
Subordinate ship officers, 4929c.
Subornation of perjury, 4587c.
Subpoena, 5606a, 6342c.
Subsidiary motions, 4510a.
Subsidy, 5606a.
Sub-species, 1410a.
Substantive law, 3349d.
Subsurface irrigation, 5322d, 5323b.
Subtraction, 5606c.
Subtraction in algebra, 190c.
Subtraction of compound denominate numbers, 1767b.
Subtraction of fractions, 2286a.
Subtraction of mixed numbers, 2287a.
Subway, or underground railway, 5608c.
Succath, 4526b.
Succession Wars, 5609a.
Succory, 1320d.
Sucker, 5611a.
Suckling, Sir John, 5611b.
Suckling, Maurice, 4113c.
Sucre (coin), 1468d.
Sucre, Bolivia, 5611c.
Sudan, 5611c.
Sudan grass, 5612b.
Sudbury, Ont., 5612c.
Sudd, 4237d.
Sudermann, Hermann, 5612c.
Sue, Marie Joseph Eugene, 5613a.
Suede gloves, 2513b.
Suez, Egypt, 5613c.
Suez Canal, 3385d, 3722d, 5613d, 6159b.
Suffolk punch, 2840c.
Suffrage, 5614a.
Sugar, 660a, 5614b, 5616d.
Sugar beets, 660a.
Sugar berry, 4130a.
Sugar cane, 5616d.
Sugar charcoal, 1270a.
Sugar maple, 3642b.
Sugar of lead, 3355d.
Sugar pea, 4534b.
Sugar pine, 4678c.
Suggestion, 5617d.
Suggestion in child training, 6288b.
Suicide, 5618b.
Suisun Bay, 5137c.
Suleiman, 5438b.
Sulky plow, 4709b.
Sulla, Lucius Cornelius, 3654a, 5619a.
Sullivan, Anne, 3219b.
Sullivan, Sir Arthur Seymour, 5619c.
Sullivan, John L., 4830c.
Sullys Hill National Park, 4505c.
Sulphates, 5620a.
Sulphonal (antidote), 282c.
Sulphur, 3002d, 3516b, 5620b.
Sulphureted hydrogen, or hydrogen sulphide, 5621a.
Sulphuric acid, or oil of vitriol, 5621a.
Sulphur matches, 1338d.
Sulphur Mountain, 5046a.
Sultan, 5621c.
Sultana, 5621c.
Sultana raisins, 4924d.
Sulte, Benjamin, 1142b, 5621c.
Sulu Islands, 5621d.
Sumac, or sumach, 5621d.
Sumatra, 5622b.
Sumida River, 5828c.
Summary court-martial, 1613c.
*Summa Theologia*, 5235d.
Summer coat of weasel, 6229c.
Summerland, B. C., 5622d.
Summerside, P. E. I., 5623a.
Summer stories, 5570d.
Summer tanager, 5696c.
Summer tare, 5702a.
Summons, Writ of, 4831a.
Sumner, Charles, 4667c, 5623a.
Sumptuary laws, 1562d, 5623c.
Sumter, Fort, 2272c.
Sumter, S. C., 5623d.
Sun, 5624a.
Sun, Eclipse of the, 1915c.
Sunapee, 5886b.
Sunapee Mountain, 4155d.
Sunbird, 5626c.
Sunbury, Pa., 5626d.
Sunda Islands, 5627a.
Sun dance, 5627a.
Sunday, 5627b.
Sunday, William Ashley, 5627c.
Sunday schools, or Bible schools, 4915a, 5627d.
Sunderland, Eng., 5628c.
Sundew, 5628c.
Sun dial, 5628d.
Sun fish, 5629b.
Sun flower, 5629d.
Sunflower State, 3203a.
Sun motor, 5432c.
Sunnites, 5352b.
Sun River project, 3905d.
Sunshine State, 5463a.
Sun spots, 5625b.
Sunstroke, 5630a.
Sun time, 5523d.
Suomi, 2176d.
Superbus the Proud, 5706c.
Superficial median vein, facing 1388.
Superficial radial vein, facing 1388.
Superheated steam, 5528d.
Superior, Lake, 2596a, 5630c.
Superior, Wis., 5631b.
Superior conjunction, 1540a.
Superior maxillary, 2738d.
Superlative degree, 1519c.
Superman, The, 4233b.
Supernatural, 4331a.
Supernaturalism, 5631c.
Superstition, 5631d.
Supinators, 373a.
Suppician Fathers, 4432a.
Supply and demand, 786b, 1918b, 5638c, 6025b.
Supremacy, 5638c.
Supreme Council, 3681c.
Supreme Court, 1614a, 5638c.
Supreme Court (Dist. of Col.), 1614b.
Sur, 5933c.
Surabaya, or Soerabaya, 5640a.
Surakarta, or Soerakarta, 5640b.
Suras, 3276d.
Surat, India, 5640b.
Surface currents, 4333a.
Surface measure, Table of, 1763d.
Surface of a sphere, 5495a.
Surface-painted enamels, 2030b.
Surgeon bird, 3091d.
Surgery, 239c, 5640c.
Surgical dentistry, 1768c.
Surinam coffee, 1464c.
Surinam River, 4489c.
*Surrender of Breda*, 4453.
Surveying, 5641c.
Survey of public lands, 3309b.
Surveyor's compass, 1521c.
Surveyor's linear measure, 1764a.
Surveyor's surface measure, 1764a.
Survival of the fittest, 1705d, 4080d.
Susa, Persia, 5642a.
Susan B. Anthony Federal Suffrage amendment, 6347c.
Suspension Bridge, Ont., 4223b.
Suspension bridges, 921c.
Suspension of treaties, 5869b.
Susquehanna River, 4565d, 5642a.
Sussex, N. B., 5642b.
Sussex spaniel, 5479d.
Sutherland, Douglas, 2516c.
Sutlej River, 5642c.
Sutro tunnel, 4135c.
Suttee, 2944a, 5642c.
Suva, Fiji Islands, 2170a.
Suwanee River, 2213d.
Suyorov, Alexei, 5128a.
Suzerain, 2158c.
Sverdrup, Otto, 2015a.
Svir River, 4376b.
Swainson's hawk, 2723d.
Swainson's warbler, 6137a.
Swallow, 5643a.
*Swamp Angel, The*, 5874c.
Swamp blackbird, 757b.
Swamp dwellers, 1244c.
"Swamp Fox," 3653a.
Swamp hickory, 755a.
Swamp maple, 3643a.
Swamp pine, 4677d.
Swamp rose mallow, 2791c.
Swamp sassafras, 3596b.
Swan, 5643b.
Swan (constellation), 3805c.
Swan, Anna, 2489c.
Swan, J. M., 5277a.
Swan song, 5643c.
Swarm of bees, 651d.
Swayne, Charles, 2936a.
Swaziland, Africa, 84b.
Sweat glands, 4599a, 5400b.
Sweating sickness, 5644a.
Sweatshop system, 5644b.

Sweden, 5645a.
Swedenburg, Emmanuel, 5651d.
Swedenborgians, 5652a.
Swedish clover, 1440a.
Swedish mile, 3796c.
Swedish national hymn, 2894c.
Swedish nightingale, 4235a.
Swedish system of gymnastics, 3450a.
Swedish turnip, 5918d.
Sweeney, Robert, 1141b.
Sweet alyssum, 5652c.
Sweet bay, 632a, 3596b.
Sweet birch, 728b.
Sweetbread, 4477a, 5652c.
Sweetbrier, 1963d; color plate, facing 2224.
Sweet chocolate, 1457a.
Sweet cider, 1378a.
Sweet clover, 3725d.
Sweet corn, 1585d.
Sweet flag, 5652d.
Sweet John, 4681a.
Sweet laurel, 3344b.
Sweet locust, 2827a.
Sweet mint, 3838b.
Sweet oil, 4370b.
Sweet pea, 5652d.
Sweet potato, 5653d.
Sweet scabious, 2207a.
Sweet violet, 6088d.
Sweet William, 4642d, 4681a, 5654b.
Swett, John, 5654b.
Swift, 5654d.
Swift, Jonathan, 5655a.
Swift Current, Sask., 5656a.
Swimming, 5656b.
Swinburne, Algernon Charles, 5658a.
Swine, 2806b.
*Swing, The*, 3319b.
Swinton, William, 5658c.
Swiss chard, 1270c.
Swiss cheese, 1291c.
*Swiss Family Robinson*, 6374c.
Swiss Guards, 5658d.
Swiss military system, 5662c.
Swiss peasant's home, 5663b.
Swiss stunde, 3796d.
Switchboard, 5738d.
Switzerland, 5659a.
Switzerland, Flag of, 2199d.
Switzerland of America, 932a.
Swivel truck, 3029c.
Sword, 5666a.
Sword blades, 5542d.
Swordfish, 5666c.
Sword of Damocles, 1694b.
Syagrius, 3747d.
Sycamore, 4696c, 5666d.
Sycamore maple, 3643a.
Sydenham, Charles Edward Poulett Thomson, 5667a.
Sydenham River, 4433d.
Sydney, Australia, 5667d.
Sydney, Cape Breton Island, 5667d.
Sydney, University of, 5667d.
Sydney Mines, Cape Breton Island, 5668a.
Sydproven, Greenland, 2618b.
Syene, Egypt, 2564b.
Syenite, 2564a.
Syllabary, 212b.
Syllable language, 1346c.
Syllable-name (in music), 4029d.
Syllogism, 3486a, 4946a
Sylvania, 4563b.
Sylvan Lake, 5465a.
Sylvester II, 4426a.
Sylvius, Aeneas, 4691a.
Symbol, 5668b.
Symmachus, 285b.
Sympathetic ink, 1451a.
Sympathetic nervous system, 4121b.
Sympathetic strike, 5592d.
Sympathetic vibration, 5445d.
*Symbolic Book of the Evangelical Church*, 1630c.
Symbols, Chemical, 1294c.
Synagogue, 5669a.
Syncope, 2126d.
Syncopation, 4025d.
Syndicalism, 5669c.
Synecdoche, 3757d, 5669d.
Synge, John Millington, 5670a.
Synod (Presbyterian), 4809d.
Synodical month, 3931b.
Synovial fluid, 3167c.
Synovial membrane, 3727b.
Syntax, 2557a, 5670b.
Synthesis, 244b, 5799b.
Syracuse, Battle of, 2167b.
Syracuse, N. Y., 5670d.
Syracuse, Sicily, 321d, 5670c.
Syracuse University, 5671d.
Syr-Darya, or Sir-Daria, River, 5672a.
Syria, 477d, 5672a, 5910b.
Syriac, 5672c.
Syrian rite, 3466d.
Syrian turban, 5904a.
Syringa, 5672c.
Systemic circulation, 1388a.
Syzygy, 1540a.
Szegedin, Hungary, 5672d.

# T

T, 5673a.
Tabby, 1221d.
Taber, Alta., 5673b.
Tabernacle, 3393d, 5673b.
Tabernacles, Feast of, 5674b.
Table mushroom, 4014b.
Table of days, 1053a.
Table of illiteracy, 2931c.
Table of Magnates, 2872c.
Table of magnitudes, 5528d.
Table of miles, 3796c.
Table of mortality, 3957d.
Table Top Mountain, 4888c.
Taboo, 5674b.
Tabor, Mount, 5674d.
Taborites, 2881c.
Tabriz, Persia, 5675a.
Tabu, 5674b.
Taché, Alexander Antonin, 5675b.
Taché, Sir Etienne Pascal, 5675d.
Tacitus, Publius Cornelius, 5676a.
Tacking, 5144b, 5676c.
Tacoma, Mount, 4924a.
Tacoma, Wash., 5676b.
Taconic Mountains, 5677a.
Tactics, 5585b, 5677b.
Tactile sense, 5847d.
Tadmor, Arabia, 4466a.
Tadoussac, Que., 5142b.
Tadpole, 994d, 5678b.
Tael, 1468d.
Taffeta, 5678b.
Taft, Alphonso, 5679b.
Taft, Charles Phelps, 5679d.
Taft, Lorado, 5678c.
Taft, William Howard, 4638a, 5679a.
Taft-Fielding treaty, 5682b.
Tagliamento River, 6166a.
Tagore, Sir Rabindranath, 5687a.
Taguan, 2240d.
Tagua palm, 3089d.
Tagus, 5789c.
Tagus River, 4779d, 5473b.
Tahiti Archipelago, 5427a.
Tahoe, Lake, 1058c, 4134c, 5687b.
Tai-dong River, 1364b.
Tai Han, 1364a.
Taikun, 5358a.
Tailor bird, 5687c.
Tainan, Island of, 2267b.
Taine, Hippolyte Adolphe, 5687d.
Tai-Ping rebellion, 149d.
Taj Mahal, 5688a.
Talc, 2688b, 5688d.
Talent, 5689a.
*Tale of Two Cities*, 2336b.
*Talisman, The*, 5689b.
Talking machine, 5689c.
Talladega, Ala., 5691a.
Tallahassee, Fla., 5691b.
Talleyrand - Perigord, Charles Maurice, 4677a, 5691c, 6377d.
Tallow, 5692b.
Tallow tree, 5692c.
Talmage, Thomas De Witt, 5692d.
*Talmud*, 2755a, 5693b.
Talon, Jean Baptiste, 5693c.
Talus, 5431a, 5693d.
Tamaqua, Pa., 5694a.
Tamarack, 3333d, 5694a.
Tamarind, 5694b.
Tamberlane, 5816b.
Tambourine, 5694b.
Tamjurt, Mount, 463d.
Tammany Hall, 5695b.
Tammany Society, 5694c.
"Tammany tiger," 4071d.
Tampa, Fla., 5695c.
Tampico, Mexico, 5696a.
Tampu Tocco, 2937a.
Tamsui, Formosa, 2267d.
Tamworth boar, 2806b.
Tanager, 5696b.
Tanana River, 140a, 6404c.
Tananarivo, Madagascar, 5696b.
Tana River, 4284a.
Tancred, 5696d.
Taney, Roger Brooke, 5697a.
Tanganyika, Lake, 5697b.
Tangerine, 5697c.
Tangier, Morocco, 5697d.
Tankage, 2381d.
"Tanks," British, 5439c.
*Tannhäuser*, 1363c, 5698a.
Tannic acid, 5698b.
Tannin, 5722d, 5698b.
Tanning, 5698c.
Tansy, 282c, 5698c.
Tantalum, 1295a.
Tantalus, 5698d.
Taoism, 5699a.
Tao-Kwang, 4391d.
Taos, Mount, 4172b.
Taotai, 3215a.
Tapajos River, 5699a.
Tapestry, 5699b.
Tapestry Brussels, 1199d.
Tapeworm, 5699d.
Tapioca, 1216d, 5700a.
Tapir, 5700c.
Tapping rubber trees, 2645d.
Taproot, 5078c.
Tar, 4679a, 5701a.
Tarantism, 5701c.
Taranto, Italy, 5701b.
Tarantula, 5701c.
Tarbell, Ida Minerva, 5701d.
Tarbush, 2160a.
Tare, 5701d.
Tarentines, 4880b.
Target, 5702a.
Target shell, 5351d.
Targum, 5702c.
Tar Heel State, 4259a.
Tariff, 4949b, 5702b.
"Tariff of abominations," 1055b, 3096c, 5704a.
Tarim River, 3215a, 5906d.
Tarkington, Newton Booth, 5705d.
Tarpeia, 5706a.
Tarpeian Rock, 5706a.
Tarpon, 5706b.
Tarquinius, Lucius (Priscus), 5706b.
Tarquinius, Lucius (Superbus), 5706c.
Tarsal cartilages, 2119b.
Tarsals, 2253a.
Tarsus, Asia Minor, 5706d.
Tartan, 5706d.
Tartar, 5707a.
Tartar City, 4551d.
Tartar emetic, 5707b.
Tartaric acid, 5707b.
Tartars, 5707c.
Tartarus, 5707c.
Tartary, 5707d.
Taschereau, Elzéar Alexandre, 5707d.
Taschereau, Sir Henri Elzéar, 5708a.

Tashkend, Turkestan, 5708b.
Tasman, Abel Jansen, 491b.
Tasmania, Island of, 5708b.
Tasmanian cuttlefish, 3879d.
Tasmanian wolf, 5709b.
Tasmanian wombat, 6349a.
Tassago, 4556b.
Tasso, Torquato, 5709b.
Taste, 1322d, 4318d, 5710b.
Taste, in animals, 261a.
Taste and nutrition, 4318d.
Tatars, 5707c.
*Tatler, The*, 5543b.
Tattooing, 5710c.
Taunton, Mass., 5711a.
Taunton River, 4997c.
Taurus, The Bull, 5711b.
Taurus Mountains, 5711d.
Tav, 5673a.
Tavantinsuyo, 4600b.
Tax and taxes, 5711d.
Taxation without representation, 4984b.
Taxicab, 5715b
Taxidermy, 5715d.
Taximeters, 5715c.
Taxonomy, 861a.
Taygeta, 4707a.
Taygete, 5482c.
Taylor, Bert Leston (quoted), 5553a.
Taylor, [James] Bayard, 5716c.
Taylor, James M., 6040b.
Taylor, Jeremy, 5717a.
Taylor, John, 2020d.
Taylor, Pa., 5722c.
Taylor, Zachary, 3763b, 5717b.
Tay River, 5716b.
Tchad, Lake, 1258d.
Tcherkesses, 1385b.
Tea, 2267c, 5722c.
Tea and coffee, How to buy, 2819c.
Teachers' College, Columbia University, 1499c.
Teachers' colleges, 5246b.
*Teachers' Creed*, 1630c.
Teachers' duties and responsibilities, 4492d.
Teachers' equipment in nature study, 4083c.
Teachers' institutes, 5246b.
Teaching, Motivation of, 5724d.
Teak, 5727a.
Teals, 1873d.
Teasel, 5727a.
Technical and industrial education, 5727c.
Technical high schools, 5240b.
Technical schools, 5247b.
Teck, Alexander Augustus Frederick, Prince of, 5727d.
Tecumseh, 5728a.
*Te Deum*, 5728b.
Teeth, 5728b.
Tegner, Esaias, 5730b.
Tegucigalpa, Honduras, 5730d.
Tehachapi Mountains, 1057d.
Teheran, Persia, 4594b, 5730d.
Tehokhondo, Mount, 5526c.
Tehuantepec, Isthmus of, 5731a.
Telautograph, 5731c.
Telegraph, 5732a.
Telegraph, Wireless, 6320a.
Telegraph plateau, 462a.
Telemachus, 3739d, 5936b.
Telepathy, 4857c, 5736d.
Telephone, 5737c.
Telephone, Wireless, 6325d.
Telephone and telegraph contrasted, 6326c.
Telephonograph, 3029c.
Telescope, 5742d.
Tell, 197b.
Tell, William, 5744a.
Tellegen, Lou, 2139b.
Tellurium, 1295a.
Telpos, Mount, 6003b.
Tempe, Vale of, 5744c.
Temperament, 1330a.
Temperance, 5744c.
Temperature, 5744d.
Temperature, Lowest, 4726d.
Temperature for cold storage, 1471a.
Temperature of ocean water, 4333c.
Tempering, 5745a.
Tempering of steel, 5542d.
Templars, Knights, 5745c.
Temple, 5746a.
Temple, Tex., 5746b.
Temple, Sir William, 5655b.
Temple of Diana, 1787b.
Temple of Dionysus, 454a.
Temple of Fame, 6125d.
Temple of Maha Bodha, 978c.
Temple of Nike Apteros, 4237b.
Temple of Solomon, 1244d.
Temple of Victory, 454a.
Tempo, 4025d, 5746c.
Temporal, 2738d.
Tenacity, 5746c.
Tenant, 5746d.
Tenants by copy of court roll, 6085b.
Ten Commandments, 1725d.
Tender, Legal, 3370d, 3371a.
Tenderfoot, 885a.
Tendon of Achilles, 24c.
Tendons, 4011b, 5747b.
Tenement, 5747c.
Tenement - house regulation, 5747c.
Teneriffe Island, 1150a.
Teniers, David (the Elder), 5748a.
Teniers, David (the Younger), 5748a.
Tennant, Dorothy, 5526a.
Tennessee, 2314a, 5748a, 6146a.
Tennessee, University of, 5755b.
Tennessee River, 5755b.
Tenniel, Sir John, 5755c.
Tennis, 5755d.
Tennis court, 3353d.
Tennyson, Alfred, 2917c, 5755d.
Tenor, 5390d.
Tenor viol, 6088c.
*Ten Questions* (game), 2378c.
Ten Peaks, Valley of the, 4506d.
Ten-pins, 870c.
Tense, 5757b.
Tensh-Lama, 3302c.
Tensile stress, 5592a.
Tenskwatawa, 5728a.
Tent, 5758a.
Tent caterpillar, 5759a.
Tenure of Office Act, 3162b, 5759c.
Teosinte, 1590c.
Tepee, 2967b.
Terbium, 1295a.
Terence, 5760a.
Tereus, 4641b.
Terhune, Mary Virginia, 5760c.
Terminal moraine, 2501d, 3945a.
Terminal moraine of Pennsylvania, 4565c.
*Terminus*, 2023b.
Termites, 5760c.
Ternate, 3881c.
Terns, 5761c.
Terpsichore, 4012b, 5761d.
Terra, 5818d.
Terrace, 5761d.
Terra cotta, 5762a.
*Terra merita*, 5917c.
Terranium, 4083d.
*Terra Nova*, The, 5265b.
Terrapin, 5762c.
Terre Haute, Ind., 5762d.
Terres Mauvaises, 540d.
Terrestrial globe, 2511c.
Terrestrial planets, 4695d.
Terrestrial telescope, 5743c.
Terrier, 5763c.
Territorial expansion of the United States, 5971a.
Territories and dependencies of the United States, 5975b.
Territory, 5764b.
Territory of Hawaii, 2717a.
Terror, Reign of, 2336a.
Terry, Ellen Alicia, 5765a, 6225c.
Tertiaries, 2310a.
Tertiary Period, 3765c.
Tertiary roots, 5078c.
Tertulian, 5765d.
Teschen, Treaty of, 5610d.
Tesla, Nikola, 5765d.
Test Acts, 5766a.
Testator, 6286a.
Testatrix, 6286a.
Test for purity of sugar, 5616b.
Test for starch, 5530b.
Testing multiplication, 4000d.
Testing of seed, 5291d.
Tetanus, 3475b.
Tetrameter, 3756a.
Tetrazzini, Luisa, 5766b.
Tetzel, Johann, 3539b, 5766c.
Teutoburg Forest, Battle of, 2167c.
Teutonic Knights, 5766d.
Teutonic races, 5767a.
Tewa Indians, 2832a.
Tewfik, 1970d.
Tewkesbury, Battle of, 1957b.
Texarkana, Tex., and Texarkana, Ark., 5767b.
Texas, 3762b, 5767b.
Texas, University of, 5776b.
Texas leghorn, 1233c.
Texas Rangers, 4176a.
Textile, 5776c.
Textile industries in the United States, 5963d.
Thackeray, William Makepeace, 5777d.
Thaler, 5779a.
Thales, 4641c, 5318d, 5779a.
Thalia, 2548d, 4012b.
Thalli, 3406b.
Thallium, 1295a.
Thalloid hepatic, 3969c.
Thallophytes, 861d.
Thames, The, 5779a.
Thames Embankment, London, 3489b.
Thames River, Battle of the, 5779b.
Thames River, Ont., 4380c.
*Thanatopsis*, 228b, 965d.
Thane, 5779c.
Thanet, Octave, 2328d.
Thanksgiving day, 5779d.
Thanksgiving day program, 5780a.
Thayendanega, 896b.
Thayer, Sylvanus, 3897d.
*The*, Pronunciation of, 399c.
Theater, 5781b.
Theater of Dionysus, 454a, 5781d.
Theatines, Order of, 4528d.
Thebes, Egypt, 5782b.
Thebes, Greece, 5783a.
Theine, 1043d.
Themistocles, 5783b.
Thenardite, 2511a.
Theobromine, 202d.
Theocracy, 5783d.
Theocritus, 5784a.
Theodolite, 5784a.
Theodoric, 2543a, 5784b.
Theodosius the Great, 1031b, 5784d.
Theophrastus, 5785a.
Theorems, 2446c.
Theory of protection, 4844b.
Theosophy, 4331c, 5785b.
Therapeutics, 5785b.
Therapy, 5315c.
Theresa, Saint, 5785c.
Thermal springs, 5785d.
Thermal unit, 5942c.
Thermodon River, 221d.
Thermoelectricity, 5786a.
Thermoelectric pile, 5786a.
Thermograph, 5786b.
Thermometer, 5745a, 5786c.
Thermopylae, 3383a, 5787c.
"Thermopylae of America," 134b.
Thermos bottle, 5788a.
Theseum, 5788b.
Theseus, 5788c.

*Thessalonians, Epistles to the,* 5788d.
Thessaly, 5789a.
Thetford Mines, Que., 5790a.
Thetis, 5790a.
Theudemir, 5784b.
Thief crab, 2782d.
Thiele River, 4130c.
Thiers, Louis Adolphe, 5790a.
Thigh bone, 5399b.
Thimonier, Barthélemy, 5328c.
*Thinker, The,* 5047d.
Thinking, Independent, 4946d.
Third Crusade, 1652c.
Third degree murder, 4008a.
Third estate, 5536a.
Third partition of Poland, 4724d.
Third Punic War, 5059b.
Third-rail system, 1998b.
Thirst, 5790d.
Thirteen original colonies, 5976d.
Thirteenth census, 1250d.
Thirty-nine Articles, The, 401a, 1375a.
Thirty tyrants, 5791a.
Thirty Years' War, 2477c, 5791a.
Thisbe, 4879b.
Thistle, 5791d.
Thistle, Order of the, 5793b.
Thistle-bird, 227c, 1149d.
Thiva, Greece, 5783b.
Thlinkits, 140d.
Thomas, Augustus, 5793b.
Thomas, George Henry, 5793c.
Thomas, Jesse B., 3863c.
Thomas, Saint, 5794a.
Thomas, Theodore, 5794a.
Thomas à Kempis, 5794c.
Thomas Christians, 5794a.
Thompson, David, 5794d.
Thompson, Denman, 5795a.
Thompson, Mrs. Frederick Ferris, 6040a.
Thompson, James Maurice, 5795b.
Thompson, Sir John Sparrow David, 5795c.
Thompson, Sir Wyville, 4728c.
Thomson, James, 5796a.
Thor, 4051d, 4342d, 5796b.
Thoracic duct, facing 1388, 3543d, 5796d.
Thorax, 1305c.
Thoreau, Henry David, 5797a.
Thoria, 5797d.
Thorium, 5797d.
Thorn apple, 5584b.
Thornycroft, William Hamo, 5277a.
Thorold, Sir John, 5798a.
Thorold, Ont., 5797d.
Thoroughwort, 810d.
Thorpe, Rose Hartwick, 1672c.
Thor's day, 5804c.
Thorwaldsen, Bertel, 5798b.
Thorwaldsen Museum, 1571a.
Thothmes III, 4328b, 5798d.
Thought, 5798d.
*Thousand and One Nights, The,* 311c.
Thousand Islands, 5157a.
Thrace, 5799d.
Thrasher, 958c.
Thrashing machine, 5800a.
Thread, 1546b, 5800d.
*Three Butterflies, The,* 5570a.
Three-day method of canning, 2247d.
Three Graces, 2548d.
Three Rivers, Que., 5801a.
Three Sisters, Canmore, 1095a.
Three Sisters Mountains, 4403b.
*Threnodia,* 2004d.
Threshing machine, 5800a.
Thrift, 5801b.
Throgmorton, Elizabeth, 4927b.
Throw-back, 450c.
Throwing the hammer, 2677a.
Throw up the sponge (boxing), 875b.
Thrush, 5803c.
Thucydides, 5804a.
Thugs, 5804b.
Thule, 5804c.
Thulium, 1295a.
Thumb rings, 5021a.
Thun, Lake of, 5659c.
Thunder, 3429d.
"Thunderer," The, 4268a.
Thunder-pump, 754c.
Thurman, Allen G., 2730a.
Thursday, 5804c.
Thwaites, Reuben Gold, 5804c.
Thwarts, 787d.
Thycaline, 5709b.
Thyestes, 4555c.
Thyme, 5804d.
Thyroid cartilage, 3336d.
Thyroid gland, 7c, 3718b.
Thyroid lymph, 2522c.
Thysanoptera, 3001a.
Tiahuanacu, Bolivia, 801b.
Tian-Shan Mountains, 5805a.
Tiberias, Sea of, 2363c.
Tiberius [Tiberius Claudius Nero Caesar], 5805c.
Tiber River, 5805b.
Tibesti Range, 5142c.
Tibet, 5806a.
Tibia, 5399b.
Tical, 1468d.
Tic Douloureux, 5807a.
Ticino, Battle of the, 2684d.
Ticino, Italy, 4531a.
Ticino River, 5659c.
Tick, 5807b.
Tickweed, 4574b.
Ticonderoga, Battles of, 5807c.
Tidal race, 5808d.
Tides, 5808a.
Tidewater Maryland, 3671b.
Tidewater Virginia, 6093a.
Tie (music), 4025b, 5809a.
Tien-tsin, China, 5809a.
Tierce, 2151c.
Tierra Del Fuego, 5809b.
*Tierras calientes,* 3768d.
*Tierras frias,* 3768d.
*Tierras templadas,* 3768d.
Tiffin, O., 5809c.
Tiflis, Russia, 5809d.
Tiger, 5810a.
Tiger cat, 5315c.
Tiger lily, 5811a.
Tiger swallow-tail butterfly, facing 1022, 1026c.
Tiglath-Pileser I, III, 5811b.
Tigris River, 5811c.
*Tikki-Tikki-Rimbo,* 5570c.
Tilden, Samuel Jones, 2730c, 5811d.
Tilefish, 5812b.
Tiles, 5812d.
Tilley, Sir Samuel Leonard, 5813a.
Tillman, Benjamin Ryan, 5813a.
Tilly, Johann Tzerclaes, Count of, 5813b.
Tilsit, Peace of, 4065b.
Timagami Forest Reserve, 4382c.
Timber, Present stand of, 3522b.
Timber gain and loss, 3532c.
Timbrel, 5694c.
Timbuktu, West Africa, 5813d.
Time, 5814b.
Time, Divisions of, 2438b.
Time, Standard, 5532d.
Time, Table for measuring, 1765d.
Time and longitude, 3499a.
Time around the world, 5814b.
Time for reading, 4938d.
Time loan, 578a.
Time lock, 3474b.
Time measure, Table for, 1765d.
Time of oscillation, 4558d.
Time tables for cooking, 1566c.
Timothy (Bible), 5815b.
Timothy (plant), 5815c.
Timrod, Henry, 5815d.
Timur, 5816a.
Tin, 5816c.
Tincture (heraldry), 2776d.
Tin plate, 5816d.
Tint, 1483d.
Tintoretto, 5817b.
Tint tools, 6351c.
Tipitapa River, 4227a.
Tippecanoe, Battle of, 2703d, 5817d.
"Tippecanoe and Tyler too," 2705b.
Tip-top Hill, 4380a.
Tirach Mir, 2798d.
Tiro, Marcus Tullius, 5360d.
Tirol, 5933d.
Tisiphone, 2353a.
Tissaphernes, 167a, 6376b.
Tissot, James Joseph Jacques, 5818a.
Tissue, 5818b.
Titan (satellite), 5220a.
*Titanic, The,* 2904c, 5354b, 5818c.
Titanides, 5818d.
Titaniferous metals, 5818d.
Titanium, 5818d.
Titans, 4042d, 5818d.
Tithes, 5819a.
Titian, 5819b.
Titicaca, Lake, 5820a.
Titlark, 4682a.
Title, 5820b.
Title deeds, 5820b.
Titles in letter writing, 3389d.
Titles of honor, 5820d.
Titmouse, 5821b.
Titus (Bible), 5822b.
Titus (emperor), 5821d.
Titus, Arch of, 5822a.
Tiu, 5897d.
Tiumen, Siberia, 5370c.
Tivoli, Italy, 5866a.
Tlingits, 140d.
Toad, 5822b.
Toad-fish, 1780c.
Toadflax, 5823b.
Toadstool, 2350c, 4013b.
*To a Skylark,* 3335c.
Toaster, Electric, 1988b.
Tobacco, 1378c, 3415c, 5823c.
Tobacco Belt, Golden, 6094d.
Tobacco root, 755b.
Tobacco wood, 6342a.
Tobacco worm, 5825d.
Tobago Island, 5826b.
Toboganning, 5826c.
Tobolsk, Siberia, 5826d.
Tocantins River, 5826d.
Tocqueville, Alexis Charles Henri Clérel de, 5827a.
Todd, Frank Morton (quoted), 5190a.
Todd, Mary, 3439b.
Toga, 5827b.
Toggle iron, 2693d.
Togo, Heihachiro, 5827d.
Togoland, 81d, 5828a.
*To Have and To Hold,* 3111a.
Toilet soaps, 5424b.
Toisechs, 5261b.
Token coins, 1467b, 3885d.
Tokyo, 5828a.
Tokyo, University of, 5829a.
Toledo, O., 5829b.
Toledo, Treaty of, 4692d.
Toledo War, 3789a.
Tolentino, Treaty of, 4757a.
Toleration Act, 4245c, 4960c.
Tolime, Mount, 1477b.
Toll and tollgates, 5830b.
Tolls, Panama Canal, 4474c.
Tolstoi, Count Lyoff Nikolayevitch, 5830d.
Tolts, 4151d.
Tom, Mount, 2814c.
Tomahawk, 5832a.
Tomato, 5832a.
Tomb, 5833a.
Tombigbee River, 5833c.
Tomb of Grant, 2572b.
Tomb of Henry VIII, 2771d.
Tomb of Napoleon, 4066b.
"Tom Thumb" (locomotive), 1568c.
Tomtit, 5821b.
Ton, 5833d.
Tone, 4021b, 5833d.
Tonegawa River, 3118c.

Tonga Islands, 5834a.
Tongass National Forest, 138d.
Tong-king musk, 4033a.
Tongue, 3983c, 5834b.
Tongue grafting, 2550c.
Tonic, 5834c.
Tonic (music), 3234a.
Tonkin, 5834d.
Tonnage, 5835b.
Tonnage of the Panama Canal, 4474c.
Tonneau, 513d.
Tonquin musk, 4584c.
Tonsil, 5835b.
Tonsillitis, 5835c.
Tonsils, Diseased, 1946a.
Tonsure, 5835d.
Tontine insurance, 3006a.
Tonty, or Tonti, Henry de, 5835d.
Tool steel, 5542b.
Toombs, Robert, 5836a.
Toothache tree, 4816a.
Toothpick State, 369c.
Top, 5836b.
Topaz, 2688b, 5836c.
Topeka, Kan., 5836d.
*To Pennsylvania*, 4572b.
Top fermentation, 917a.
Toplady, Augustus Montague, 5837b.
Topographic chart, 1282a.
Topographical surveying, 5641d.
Toquilla fiber, 1478d.
Torch-Bearer, 1088d.
Torghattan Island, 4289a.
Torii gate, 3117b.
Torino, Italy, 5905d.
Tornado, 5837c.
Tornea River, 5646c.
Toronto, Ont., 5838a.
Toronto, University of, 5840c.
Torpedo, 5841a.
Torpedo (fish), 5843b.
Torpedo boat, 5843c.
Torpedo-boat destroyer, 5843a.
Torquemada, Tomas de, 5843d.
Torrens, Sir Robert, 5844a.
Torrens system, 5844a.
Torricelli, Evangelista, 117d, 5844d.
Torrid zone, 5885b, 6415c.
Torrington, Conn., 5845a.
Torsional stress, 5592a.
Torsion balance, 5845b.
Tort, 1636c, 5845c.
Torticollis, 4993b.
Tortillas, 908d, 3766b.
Tortoise, 5845d.
Tortoise shell, 5846a.
Tortoise shell cat, 1221b.
Torture, 5846b.
Tory, 5846c.
Tory, Henry Marshfield, 5847a.
Toscanelli, 2423d.
Tostig, 2692c.
Totem, 2965b, 4899a, 5847a.
Toucan, 5847c.
Touch, 1323c, 5847d.
Touch of animals, 261a.
Toulon, France, 5848b.
Toulouse, Battle of, 6244a.
Toulouse, France, 5848c.
Tourgee, Albion Winegar, 5848d.
Touring car, 514a.
Tourmaline, 4731a, 5848d.
Tournament, 5849b.
Tourney, 5849b.
Tourniquet, 5849c.
Tours, Battle of, 2167c.
Tours, France, 5849d.
Toussaint, François Dominique, 5850a.
Tower, 5850c.
Tower, The (Montessori Method), 3920c.
Tower of Jewels, 4475b.
Tower of London, 5850d.
Tower of the Winds, 454a.
Towers of silence, 5851b.
Town meeting, 5851c.
Townshend Act, 4984d, 5979a.
Townships, 3309b.
Township type of government, 5975d.
Towton Field, Battle of, 1957a.
Toxic gastritis, 2406b.
Toxicology, 5851d.
Toxins, 2142b, 5852a.
Toynbee, Arnold, 5427a.
Toys, 5852a.
Tracery, 5853b.
Trachea, 7c, 5853d.
Trachoma, 769b.
Trachyte, 5854a.
Tractarians, 4436a.
Traction engine, 5854a.
Tractor, 5854a.
*Tracts of the Times*, 4436a.
Trade, Board of, 785d.
Trade Commission Act, 6304a.
Trade discount, 1803a.
Trade-mark, 5854c.
Trade routes on the Pacific, 5967a.
Trade schools, 5247c.
Trade unions, 3285d.
Trade winds, 5855d.
Trading with the enemy, 760c.
Trafalgar, 5856c.
Trafalgar, Battle of, 4114c.
Trafalgar Square, 3488d.
Tragacanth, 5856d.
Tragedy, 1509a, 5857a.
Tragi-comedy, 5857a.
Tragopan, 5857b.
Trail, B. C., 5857c.
Trailing arbutus, 317b.
Traill, Catherine Parr, 1143a, 3938c, 5857d.
Training camps, 6178a.
Training in perception, 4583b.
Training of athletes, 457d.
Training of children in deliberative action, 6288b.
Training of employees, 6106c.
Train of the savage, 4919c.
Train of wheels in a watch, 6212b.
Trajan, 5857d.
Trajan's Arch, 5858b.
Trajan's Column, 5858c.
Trammel net, 4122c.
Trance, 5858c.
Trance mediums, 5501c.
Transalpine Gaul, 2408a.
Trans-Caucasia, 1238d.
Transcendentalism, 5858c.
Transcendentalist School of Philosophy, 4642b.
Transcona, Man., 5859a.
Transcontinental railroads, 4920c.
Transept, 4093d, 5859a.
*Transfiguration*, 4453, 4931c.
Transformation of energy, 2032c.
Transformer, 5859b.
Transformer, in wireless telegraphy, 6323c.
Transfusion of blood, 776c.
Transit (astronomy), 5859c.
Transit (instrument), 5859d.
Transitive verbs, 6056b.
Transit of Mercury, 3743c.
Transit of Venus, 6054c.
Translucent enamel, 2030b.
Transmigration of the soul, 5860b.
Transmission (automobile), 515a.
Transmission of light, 3423c.
Transmitter, Telephone, 5738b.
Transmitter, Wireless telephone, 6327b.
Transpiration, 2105d, 3363b.
Transportation, 5860c.
Transportation in Canada, 1110a.
Transportation in the United States, 5964b.
Transportation of soil, 5431c.
Transportation routes in Alaska, 5970a.
Transposed order of the sentence, 5304b.
Trans-Siberian Railway, The, 5861b.
Transvaal, The, 5862d.
Transverse colon, 7c, 3024b.
Transverse valley, 6022c.
Transylvania, 506c.
Trapdoor spider, 5498b, 5865a.
Trapezium, 4882b, 5865b.
Trapezoid, 3735d, 4882b.
Trappists, 5865b.
Traumatic cataract, 1223d.
Traumatic iritis, 769c.
Travel, Story of, 4919a.
Traveler's joy, 1415b.
Traveling buck, 5509d.
Traveling libraries, 99d.
Traverse, Lake, 4954b, 5465a.
Traverse City, Mich., 5865c.
Travertine, 5865d.
Travis, William Barrett, 134c.
Trawl, 2187d.
Trawl net, 4122c.
Treacle, 3876a.
Treadmill, 5866a.
Treason, 5866b.
*Treasure Island*, 4692d, 5553a.
Treasurer of the United States, 5867c.
Treasure State, 3903a.
Treasure-trove, 5866d.
Treasury, 5867a.
Treasury Building, 6195c.
Treasury notes, 2615d.
Treaties, Enforcement of, 5868d.
Treaty, 5867d.
Treaty of 1814, 4500c.
Treaty of 1815, 4500c.
Treaty of 1856, 4500d.
Treaty of 1898, 4500d.
Treaty of Paris (1763), 4500a.
Treaty of Paris (1783), 4500b, 4989c.
Trebizond, Turkey, 5869c.
Treble, 5870a.
Treble clef, 4022d.
Treble viol, 6088c.
Tree, 5870a.
Tree, Sir Herbert Beerbohm, 5872b.
Tree clover, 1440a.
Tree cricket, 1634d.
Tree frog, 5872c.
Tree kangaroo, 3202c.
Tree of life, 317a.
Tree of the universe, 6393c.
Tree-Planter State, 4100a.
Tree planting, Suggestions for, 5871d.
Tree sparrow, 5482a.
Trees, King of, 1059d.
Tree swallow, 5643b.
Tree toad, 5872c.
Trefoil, 5872d.
Trekbokken, 5509d.
Trembling mushroom, 4014d.
Trembling poplar, 425b.
Trembling prairies, 3513c.
Trenches, 2270b.
Trench system, 6156c.
Trent, Council of, 4691b, 5873b.
Trent Affair, The, 5873b.
Trent Canal, 5873c.
Trente-et-quarante, 5090b.
Trenton, Battle of, 4987c, 5874a.
Trenton, N. J., 5874b.
Trenton, Ont., 5874a.
Trenton Battle Monument, 4166c.
Trenton series, 5875a.
Trent River (Eng.), 5873a.
Trent River (Ont.), 4380c.
Trent Valley Canal, 5873d.
Trepang, 5875b.
Trepanning, 5875c.
Trephining, 5875c.
Trespass, 5875c.
Triad chord, 4031d.
Trial balance, 821c.
Trial by battle, 627a, 4401a.
Trial by combat, 627a, 4401a.
Trial by ordeal, 4400c.
Triangle, 3735b, 5876a.
Triangular measurements, 5877b.
Triangulation, 2420d.
Triassic brownstones, 5189a.
Triassic Period, 2440d.
Triassic system, 5877d.
Tribulation, 2087a.

Tribune, 5878a.
Tribune of the people, 3839c, 5058a, 5878a.
Tributa Comitia, 1511c.
*Tribute Money,* 4453.
Triceps muscle, 4011b.
Trichina, 5878b.
Trichiniasis, 5878c.
Trichoptera, 3001a.
Tri-Cities, 1708c, 5043d.
Tricolor, 5878c.
Tricycle, 5878d.
Trieste, Austria, 5878d.
Trigonometry, 5879b.
Trillium, 5879c.
Trimeter, 3756a.
Trinacria, 4343d.
Trincomalee, Ceylon, 1258b.
Trinidad, Colo., 5880b.
Trinidad Island, 5880a.
Trinitrotoluene, 2115a.
Trinity, 5880c.
Trinity Church and churchyard, 4207c.
Trinity Sunday, 5880d.
Trip hammer, 5880d.
Triplane, 2238c.
Triple Alliance, 3086a, 5881a.
Triple Divide Mountain, 2502c.
Triple entente, 4595d, 5881b.
Triple rhyme, 4004d.
Triplet (music), 4025a.
Triple valve, 119b.
Tripod lens, 4085a.
Tripoli, 5882b.
Tripoli rock, 4912b, 5882c.
Tripolitania, 5881d.
Trireme, 2365d, 5882c, 6181b.
Triton, 4117c.
Triumph, 5882d.
Triumvirate, 287b, 477a, 1377c, 3384b, 5883a.
Trixillo, Spain, 4602a.
Trochalc meter, 3755d.
Trochas, 5480a.
Trogon, 5883b.
Trois Rivières, Que., 5801a.
Trojan War, 5887a.
Trolley lines, 1998a.
Trollhattan, Sweden, 5646c.
Trolling, 5883b.
Trollope, Anthony, 5883d.
Trombone, 5884a.
Tromp, Martin Harpertzoon, 5884b.
Trondhjem, Norway, 5884d.
Troop, 380b.
Tropical fruit comparisons, 1061c, 2215c.
Tropical zone, 6416a.
Tropic bird, 5885a.
Tropic of Cancer, 5885b.
Tropic of Capricorn, 5885b.
Tropics, 5885b.
Trotzky, Leon, 6165a.
Troubadour, 5885c.
Troubetzkoy, Princess, 5027a.
Trout, 5885d.
Trout lily, 1830c.
Trouvères, 5886c.
*Trovatore, Il,* 5886c.
Trowbridge, John Townsend, 5886d.
Troy, 4815c, 5887a.
Troy, N. Y., 5889a.
Troyes, France, 5890c.
Troyes, Treaty of, 2871d.
Troyon, Constant, 4454d.
Troy pound, 4802c, 5889c.
Troy weight, 5890d.
Troy weight, Table of, 1765c.
Truchas, Mount, 4172b.
Truckee-Carson Canal, 4971b.
Truckee-Carson irrigation project, 4135c, 4136a.
Truckee River, 5687c.
Truck farming, 97a, 6042c.
Truck farming, Intensive, 3010b, 6042c.
Trucks, Automobile, 515b.
True bill, 716c, 3192b.
True locust, 2577d.
True-netted leaves, 6046d.
True seals, 5280d.
True vocal cords, 3337a.
Trumbull, Jonathan, 1548d, 5890a.
Trumpet, 5890c.
Trumpet-creeper, 715c.
Trumpeter swan, 5644a.
Trumpet-flower, 715c.
Trunk-back, 3360a.
Trunk monkey, 3891d.
Truro, N. S., 5890d.
Truss bridges, 922a.
Trust, 5891a.
Trust companies, 578d.
Trustee, 5894d.
Trusties (prison), 4828c.
Trust legislation, 5893c.
Trypsin, 4477a, 4579c.
Tsana Lake, 77d.
Tsanpo River, 890a, 5806b.
"Tsar Kolokol," 676c.
Tschaikovsky, Peter Ilich, 5894d.
Tschamut, Switzerland, 5660d.
Tsetse fly, 5895b.
Tsimpsean Peninsula, 4821d.
*Tsuga Canadensis,* 2766d.
*Tsuga Heterophylla,* 2767a.
Tuaregs, 689c.
Tuberculosis, 3415d, 5895c.
Tuberose, 5896c.
Tubular leprosy, 3384c.
Tucson, Ariz., 5896d.
Tucumán, Argentina, 5897b.
Tudor, House of, in England, 4699d, 5897b.
Tudor style, 5897d.
Tuesday, 5897d.
Tufa, 5898a.
Tufted titmouse, 5821c.
Tufts, Charles, 5898a.
Tufts College, 5898a.
Tuileries, 5898b.
Tulane, Paul, 5898c.
Tulane University, 5898c.
Tulip, 989d, 5898d.
Tulip tree, 5899b.
Tullianum, The 3181b.
Tulsa, Okla., 5899c.
Tumbler, 3966b.
Tumbleweed, 5793b, 5899d.
Tumor, 2783b, 5900a.
Tuna, 5902b.
Tundra, 5900a.
Tungsten, 5900b.
Tungsten lamp, 1990b.
Tungsten steel, 5542d.
Tunguragua, Mount, 249d.
Tunic, 5900b.
Tunicle, 5900c.
Tuning, in wireless telegraphy, 6324a.
Tuning coil, 6324c.
Tuning fork, 5900d.
Tunis, 5901a.
Tunkers, 1882b.
Tunkhannock Viaduct, 4918a, 6075c.
Tunnage, 5703b.
Tunnel, 5901c.
Tunnels in New York City, System of, 4212c.
Tunny, 5902b.
Tupper, Sir Charles, 5902c.
Tupper, Sir Charles Hibbert, 5903c.
Turan, 3043d.
Turban, 5903d.
Turbinate bones, 2123d.
Turbine, 5904b.
Turbine wheel, 5904b.
Turbot, 5905a.
Turcos, 6419c.
Turgenieff, Ivan Sergeyevitch, 5905b.
Turgot, Anne Robert Jacques, 5905d.
Turin, Italy, 5905d.
Turkestan, 5906b.
Turkey (bird), 5916c.
Turkey (country), 5907a.
Turkey, Flag of, 2199d.
Turkey buzzard, 1029c, 5917b.
Turkey red, 201c.
Turkey vulture, 5917b.
Turkish accent, 4840d.
Turkish bath, 623d.
Turkish boxwood, 6351c.
Turkish drum, 1865d.
Turkish red crescent, 4952b.
Turks, 5917c.
Turmeric, 5917c.
Turner, H. Godfrey, 4803c.
Turner, Joseph Mallard, 5917d.
Turner, Nat, 4077b.
Turnip, 5918c.
Turnstone, 5920a.
Turnverein, 5919a.
Turpentine, 4679a, 5919b.
Turpentine, Antidote for, 282c.
Turpentine tree, 4684b.
Turpentine varnishes, 6038b.
Turquoise, 5919d.
Turquino, Mount, 1656d.
Turret, 1218d.
Turtle, 5920a.
Turtle, Leatherback, 3360a.
Turtlebacks, 6182d.
Turtledove, 4671a, 5920d.
Turtle Lake, 5795a.
Turtle Mountain Forest Reserve, 3628b.
Tuscaloosa, Ala., 5921a.
Tuscany, 5921b.
Tuscarora Indians, 5921c.
Tuskegee Normal and Industrial Institute, 5921d.
Tussock moth, 5922b.
Tutuila Island, 5182a.
Twain, Mark, 1415c.
Twala, 2153d.
Tweed, 5922c.
Tweed, William Marcy, 5922c.
Tweede Kamer, 4126a.
Tweed Ring, 5922c.
Twelve great paintings, 4455d.
Twelve labors of Hercules, 2780a.
Twelve Tables, Law of the, 5922d.
Twentieth century dress, 1859c.
Twilight, 5923a.
Twilight of the Gods, 4044c.
Twilight sleep, 253d.
Twilled work, 616a.
"Twin Cities," 3824b, 5163a.
Twined baskets, 616a.
Twinflower, 3451a.
*Twinkle, twinkle, little star,* 3317d.
Twins, The (astronomy), 2412c.
Two-cross flag, 2197b.
Two-cross jack, 2197b.
*Two Natures,* 596a.
Two-ocean Plateau, 6391a.
Two-revolution press, 4826a.
Two-step, 1697a.
*Two Years before the Mast,* 1695d.
Tyche, 2272d.
Tycoon, 5358a.
Tydfil, Saint, 3748c.
Tyler, John, 5923b.
Tyler, Moses Coit, 5928c.
Tyler, Tex., 5929a.
Tyler, Wat., 5928d.
Tympanum, 1898d.
Tyndale, William, 5929b.
Tyndall, John, 5929d.
Type, 2644b, 5930b.
Type composition, 4823b.
Typesetter, 4823c.
Typesetting machine, 3452a, 3894a.
Types of city government, 4004d.
Typewriter, 5931a.
Typewriter for children, 1931d.
Typhoid fever, 3415d, 3719d, 5931d.
Typhon, 4683d.
Typhoon, 1355c, 5932d.
Typhus fever, 5932d.
Tyr, 4044d, 5897d.
Tyre, 5933b.
Tyre, Ruins of, 4644b.

Tyrian purple, 4874d.
Tyrol, 5933c.
Tyrtaeus, 4018b.

# U

U, 5934a.
Uaupes River, 5023c.
Ucayali River, 220d.
Udall, Nicholas, 5934b.
Ueberlinger See, 1554c.
Uffizi Palace, 5934d.
Ugákhpa Indians, 4884c.
Uganda, 5934d.
*Ugly Duckling, The*, 5566b.
Uhlan (horse), 4908d.
Uhland, Johann Ludwig, 5935b.
Uhlans, 5935c.
Uinta, or Uintah, Mountains, 5935d.
Uitlanders, 5447c.
Ujiji, Arabia, 5697c.
Ukrainians, 5113c.
Ulfilas, 3843b.
Ulm, Germany, 5935d.
Ulna, 372c, 2681a, 5399d.
Ulstermen, 2823c.
Ultimate analysis, 244c.
Ultramarine, 5936a.
Ultramontane theory, 6041b.
Ulua River, 2825b.
Ulysses, 1075b, 1385c, 5888a, 5936b, 6351d.
*Ulysses Deriding Polyphemus*, 4453.
Umbelliferae, 5937a.
Umber, 5937b.
Umbra, 4577a, 5330c.
Umbrella, 5937b.
Umbrella bird, 5937b.
Umbrellas, Paper, 6220b.
Umiak, 2077b.
Umpqua River, 4403c.
Unaka Range, 4260d, 5749c.
Unalachtigo Indians, 4006b.
Unalaska Island, 5937c.
Unami Indians, 4006b.
Uncas, 5937d.
Uncia, 4431c.
*Uncle Remus's Tales*, 2694d.
"Uncle Sam," 953d, 5889b.
*Uncle Tom's Cabin*, 1382d, 5582a.
Unction, 5938a.
*Underground Queen, The*, 4045a.
Underground railway (subway), 5608c.
Underground railroad (U. S. history), 5938b.
Underground stems, 5546b.
Undershot wheel, 6222a.
Underwear, 5326b.
Underwood, Oscar W., 5938b.
Undivided bole, 5870b.
Unfermented tea, 5723c.
Ungava, 5938d.
Ungava Bay, 3287a.
Ungulates, 5938d.
Unicorn, 5939b.
Uniformity, Act of, 4245c.
Uniforms and insignia, 5939b.
Uniform velocity, 6046b.
Union, Act of, 5940d.
Union, Labor, 6121b.
Union Canal, 5261d.
*Union Jack* (poem), 2196b.
Union Jack, 2197a.
Union of South Africa, 5941a.
Uniontown, Pa., 5942a.
Union with Ireland, 2591b, 4686c.
Union with Scotland, 2590a, 5262c.
Unit, 5942b.
Unitarians, 5942c.
United Colonies of New England, 4151c.
United Confederate Veterans, 1530c.
United Empire Loyalists, 5942d.
United Kingdom, 5043c.
United Presbyterians of America, 4810b.
United Press, 430c.
United Province of Agra and Oudh, 3588b.
United Sons of Confederate Veterans, 1530d.
United States army, 381b.
United States Bureau of Education, 1953b.
United States Constitution, 1559a.
United States Courts, 1614a.
United States debt, 4076a.
United States flag, 2194b.
United States flags, color plates, facing 5976.
United States Forest Service, 1552c.
United States Indian Training and Industrial School, 5999a.
United States in the War of the Nations, 6171a.
United States Judicial Courts, 5639c.
United States marshal, 3664a.
United States merchant marine, 3740d.
United States Military Academy, 3797b.
United States mining values, 3822c.
United States mints, 3837d.
United States mortality tables, 3955d.
United States Naval Academy, 4091b.
United States of America, 5943b.
United States of Brazil, 898a.
United States of Venezuela, 6047b.
United States parks, 4504a.
United States postal service, 4790b.
United States sculpture, 5277a.
United States Senate, 5300b.
United States Steel Corporation, 2397a, 5999b.
United States Supreme Court, 5638d.
United States tariffs, 5703c.
United States telephone service, 5742b.
United States water power, 6219d.
United States Weather Bureau, 6229b.
United Workmen, Ancient Order of, 247b.
Units, Orders of, 4291c.
Univalved mollusks, 3880b.
Univalve shell, 5344b.
Universal City, 3988a.
Universalists, 5999d.
Universal spheroid, 5495c.
Universe, 6000a.
Université Laval, 3348d.
University, 6000b.
"University City," 778c.
University Club, Chicago, 327c.
University extension, 6002a.
University of—
Alabama, 133a.
Alberta, 163c.
Berlin, 695c.
Bologna, 802c.
Bonn, 811c.
British Columbia, 942c.
California, 1065b.
Cincinnati, 1383b.
Colorado, 1493d.
Edinburgh, 1925a.
Georgia, 2461b.
Idaho, 2914a.
Illinois, 2929d.
Iowa, 3042a.
Kansas, 3211a.
Kentucky, 3231b.
Maine, 3607c.
Michigan, 3790c.
Minnesota, 3706c, 3835c.
Missouri, 3863b.
Montana, 3910c.
Nebraska, 4107c.
Nevada, 4138b.
New Brunswick, 4147d.
New Mexico, 4177a.
North Carolina, 4267b.
Notre Dame, 4293a.
Ottawa, 4429b.
Paris, 4500d.
Pennsylvania, 4573c.
Redlands, 4953b.
Saskatchewan, 5216b.
South Carolina, 5462d.
South Dakota, 5469b.
State of New York, 4216b.
Sydney, 5667d.
Tennessee, 5754b.
Texas, 5776b.
Toronto, 5840c.
Utah, 6015d.
Vermont, 6069b.
Vienna, 6084b.
Virginia, 3135b, 6099d.
Washington, 6209a.
West Virginia, 6258d.
Wyoming, 6373d.
Unknown quantities, 193d.
Unorganized territory, 5764d.
Unrestricted submarine warfare, 6170b.
"Unser Fritz," 6292c.
Unstable equilibrium, 2579b.
Unstriated muscles, 4011d.
Unter den Linden, 693b, 6002d.
Unterland, 2762a.
Unter See, 1554c.
Unwin, Morley, 1619b.
Unwritten law, 1515b.
Upas, 6003a.
Upernivik, Greenland, 2618b.
Upolu Island, 291c, 5182a.
Upland rice, 5006c.
Upolu Island, 291c, 5182a.
Upper Canada, 1123a, 4378b, 4386c, 5940d.
Upper Carboniferous stage, 2440c.
Upper case, 4823c.
Upper Cretaceous stage, 2441b.
Upper-cut, 875b.
Upper Devonian stage, 2440a.
Upper Egypt, 1966c.
Upper Falls of the Yellowstone, 6391b.
Upper Palatinate, 4457b.
Upper Town, Que., 4894d.
Upper Yellowstone Falls, 3904d.
Upper Yukon District, 6406b.
Upsalquitch River, 4979a.
Upsilon, 5934c.
Uraemia, 4116c.
Uraemic poisoning, 4116c.
Ural Mountains, 5114a, 6003b.
Ural River, 6003b.
Urania, 4012b, 6003c.
Uranium, 6003c.
Uranus (astronomy), 4695c, 6003c.
Uranus (myth), 4042d, 6004a.
Urban (Popes), 6004a.
Urban population, 4761c.
Urbana, Ill., 6004c.
Urd, 4248c.
Urdar, Well of, 4248c.
Urea, 6005a.
Ureter, 3237c, 6004d.
Urethra, 6004d.
Urga, Mongolia, 3889b.
Urianghai, 3889b.
Urine, 6004d.
Ur of the Chaldees, 1259d.
Ursa Major, 637c, 6005a.
Urso, Camilla, 6005b.
Ursula, Saint, 6005c.
Ursulines, 6005d.
Urticaria, 6005d.
Uruguay, 6006a.
Uruguay River, 6009b.
Urumiah Lake, 4595a.
Urusalim, 3141d.
Urushi tree, 3292d.
Useful arts, 390c.
*Use of Flowers*, 2223a.
Use of stems, 5546c.

Ushuaia, Argentina, 342b.
Uspallata Pass, 250c.
Ust-Dvinsk, Russia, 5018a.
Usury, 6009c.
Utah, 6009b.
Utah, University of, 6015d.
Utah Lake, 6016a.
Ute Indians, 6016a.
Utica, N. Y., 6016c.
Utica, North Africa, 6016b.
Utilitarianism, 3806b, 6017a.
Utility and value, 6025a.
*Utopia*, 3946d, 6017a.
Utrecht, Netherlands, 6017c.
Utrecht, Treaty of, 4152d, 6017d.
Uvula, 3981c, 4457b.
Uylenborch, Saskia van, 4968b.

# V

V, 6018a.
Vaagö Island, 2138c.
Vaal River, 5863c.
Vacation schools, 5241c.
Vaccinia, 6018b.
Vaccination, 3719c, 6018a.
Vacuum, 6018d.
Vacuum cleaner, 6019a.
Vacuum pan, 6019b.
Vaduz, Liechtenstein, 3408b.
Vaea, Mount, 291c, 5182b, 5552d.
Vail, Alfred, 3957c.
Vail, Theodore N., 5742a.
Valcartier Camp, Que., 5702c.
Valcour Island, 4704c.
Valdai Hills, 5113b, 6019b.
Valdez glacier, 2501a.
Valencia, Spain, 6019c.
Valencia, Venezuela, 6048a.
Valenciennes lace, 3290b.
Valens, 6019d.
Valentine, Basil, 5621b.
Valentine, Saint, 6020c.
Valentinian I, 6020d.
Valentinian III, 6021a.
Valentine day celebration, 6020a.
Valentines for kindergartens, 3245a.
Vale of Tempe, 5744c.
Valerian, 6021b.
Valerianos, Apostolos, 3177c.
Valhalla, 6021b.
Vali, 4521a.
Valjean, Jean, 3385c.
Valkyries, 6021c.
Valkyrs, 6021c.
Valladolid, Mexico, 3946d.
Valladolid, Spain, 6021d.
Vallejo, Cal., 6022a.
Valley, 6022b.
Valley City, N. D., 6023b.
Valleyfield, Que., 5169a.
Valley Forge, Pa., 6023c.
Valley Forge Memorial Park, 6023d.
Valley of Death, 6015c.
Valley of Hinnom, 2411a.
Valmiki, 4927c.
Valmy, Battle of, 2167d.
Valois, House of, 6023d.
Valois-Orleans, House of, 4414b.
Valona, Albania, 149a.
Valparaiso, Battle of, 1335b.
Valparaiso, Chile, 1333b, 6024a.
Valparaiso, Ind., 6024c.
Valparaiso University, 6024d.
Value, 6024d.
Value of metal in minor coins, 3886c.
Valve, 6025c.
Valves of veins, 6045c.
Valve trumpet, 5890c.
Valvular heart disease, 2747b.
Vampire, 6025d.
Vampire bat, 6026a.
Vanadium, 4601b, 6026c.
Vanadium steel, 5542c.
Van Alstyne, Frances Jane, 1645d.
Van Buren, Martin, 6026b.
Van Cortlandt Mansion, 4207d.
Van Cortlandt Park, 4211a.
Vancouver, B. C., 6031b.
Vancouver, George, 6032b.
Vancouver, Mount, 136b.
Vancouver, Wash., 6032c.
Vancouver Island, 6032c.
Vancouver Range, 6032d.
Vandals, 6033c.
Vanderbilt, Cornelius, 6034c.
Vanderbilt, Cornelius, the Elder, 118d, 6033d.
Vanderbilt, Gertrude, 6278c.
Vanderbilt, Gladys, 6034c.
Vanderbilt, William Henry, 6034b.
Vanderbilt, William Kissam, 6034d.
Vanderbilt University, 6034d.
Van Diemen's Land, 491b, 5708b.
Vandyke, Sir Anthony, 6035b.
Van Dyke, Henry, 6035d.
Vane of feather, 2144b.
Van Hise, Charles Richard, 6036b.
Vanhomrigh, Hester, 5655d.
Van Horn, Sir William Cornelius, 6036d.
Vanilla, 6037a.
Vanilla extract, 6037b.
Vanishing point, 4598d.
*Vanity Fair*, 5778b.
Vannucchi, Andrea, 5209d.
Vannucci, Pietro, 4604a.
Van Rensselaer, Stephen, 6037b.
Van Sion daffodil, 1686c.
Vanua Levu Island, 2170a.
Vapor, 6037c.
Vaporization, 6037c.
Vardar River, 5311d.
Variable stars, 5528b.
Variable velocity, 6046b.
Variable wind, 6310c.
Varicose veins, 6037d.
Variety (biology), 1409d, 6038a.
Varnish, 6038a.
Vasco da Gama, 2371b, 4783b.
Vase, 6038c.
Vaseline, 6038c.
Vases, Phoenician, 4644b.
Vashti, 2081a.
Vassal, 2158c.
Vassar, Matthew, 6040b.
Vassar College, 6038d.
*Vaterland, The*, 5354c.
Vathi, Ithaca, 3087b.
Vathy, Samos, 5182d.
Vatican, 6040b.
Vatican, Library of the, 3404d.
Vatican Council, 6040d.
Vatican Gardens, 6039a.
Vaudeville, 6040d.
Vaudreuil-Cavagnal, Pierre François, 6041a.
Vaughan, Herbert, 6041b.
Vault, 6041c.
Ve, 4043b.
Vedas, 6041d.
Vega, 443d.
Vega Carpio, 6042a.
Vegetable beefsteak mushroom, 4014d.
Vegetable diet, Belief in, 6044b.
Vegetable fibers, 2160c.
Vegetable ivory, 1029a, 3090a.
Vegetable ivory buttons, 1029a.
Vegetable leather, 3360a.
Vegetable oils, 4357b.
Vegetable parchment, 4481a, 4492a.
Vegetable perfumes, 4584d.
Vegetable pickles, 4661d.
Vegetables, 6042c.
Vegetables, How to buy, 2819b.
Vegetables, How to can, 2249a.
Vegetable styptics, 5597b.
Vegetarian Federal Union, 6044b.
Vegetarianism, 6044a.
Vegetation map, Africa, facing 80.
Vegetation map, Asia, facing 416.
Vegetation map, Europe, facing 2096.
Vegetation map, North America, facing 4256.
Vegetation map, South America, facing 5448.
Vegreville, Alta., 6044d.
Veinless leaves, 6047a.
Veins, 1388a, 6045a.
Veit, Philipp, 4455a.
Velasquez, or Velazquez, Diego Rodriguez de Silva y, 6045d.
Velde, Willem van de, 4454b.
Veldt, 1167c.
Vellum, 4492a, 4479d.
Velocipede, 713a.
Velocity, 6046b.
Velocity of electricity, 1986c.
Velvet, 6046c.
Velveteen, 6046c.
Velvet leaf, 2961c.
Vena cava, 7c.
Vena cava superior vein, facing 1388.
Venation, 6046c.
Vendetta, 776d, 3874b, 6047a.
Veneer, 6047c.
Venerable Bede, The, 645c.
Venetian galley, 6183c.
Venetian point lace, 3290a.
Venetian sumac, 5622b.
Venezuela, 6047b.
Venezuela message, 1424c.
Venice, Italy, 6051a.
"Venice of America," 4588c.
"Venice of the East," 4418a.
"Venice of the North," 5556b.
Venison, 1740a.
Venizelos, Eleutherios, 6053b.
Venous bleeding, 767b.
Venous blood, 6045b.
Ventilation, 2752b, 3410d.
Ventilation of schools, 2753a.
Ventilation of sleeping rooms, 2752d.
Ventricle of heart, 7c.
Ventriloquism, 6053d.
Venus (astronomy), 4695c, 6054a.
Venus (mythology), 6054c.
Venus, Transit of, 5859c.
Venus de Milo, 6055a.
Venus's flower basket, 5506c.
Venus's flytrap, 858c, 6055b.
Vera Cruz, Mexico, 3763c, 6055d.
Verandrye, Sieur de la, 6316d.
Verb, 6056a.
Verbal, 4517c.
Verbal noun, 4518a.
Verbals, 6057b.
Verbena, 6058a.
Verbs, Person in, 4597c.
Vercelli, Battle of, 1379b.
Verdandi, 4248c.
Verde antique marble, 5315b.
Verdi, Giuseppe, 6058b.
Verdigris, 1572b, 6059c.
Verdun, Battle of, 4606a, 6059d, 6161a.
Verdun, France, 6059c.
Verdun, Que., 6060a.
Verdun, Treaty of, 6060b.
Verestchagrin, Vasili, 6060b.
Vergil, 6060d.
Verigo Island, 3032c.
Verkhoyansk, Siberia, 331b, 4726d.
Vermes, 6360c.
Vermicelli, 3549b.
Vermiform appendix, 201b, 293d, 294a.
Vermilion, 3742d, 6062a.
Vermilion Chutes, 4537b.
Vermilion Range, 3829a.
Vermont, 6062a.
Vermont, University of, 6069b.
Vermont cent, 6065a.
Vernacular liturgy, 3466d.
Vernal equinox, 408d, 2067b.
Vernal Falls, 6397b.
Verne, Jules, 6069c.
Vernier, 6069d.
Vernier, Pierre, 6069d.
Vernon, B. C., 6070a.

Vernon, Edward, 3981b.
Verona, Italy, 6070b.
Veronese, Paul, 6070c.
Veronica, Saint, 6070d.
Verrazano, Giovanni da, 4279a, 6071a.
Versailles, France, 6071b.
Verst, 3796c.
Vertebrae, 5399b.
Vertebrata, 6071d.
Vertebrates, 6071d.
Vertigo, 6072b.
Vertumnus, 4747d.
Very grand sachem, 5694d.
Vespasian, 6072b.
Vespucius, Americus, 6072d.
Vesta, 6073b.
Vestibule, 1899c.
Vestibuled cars, 3029c.
Vesper, 2106a.
Vesper sparrow, 5481d.
Vestalia, 6073c.
Vesuvius, Mount, 2779b, 6073c.
Vetch, 5701d, 6074a.
Veterinary medicine, 6074b.
Veto, 6074c.
Veto power in Canada, 6075b.
"Veto President," 1420b.
Via Appia, 295c.
Viaduct, 6075c.
Via Sacra, 5062d.
Via Salaria, 5177b.
Vibrations of a pendulum, 4558d.
Vicar, 6075d.
Vicar-general, 6075d.
*Vicar of Wakefield, The,* 2529b.
Vice-admiral, 57a, 4929a.
Vicellio, Tiziano, 5819b.
Vicenza, Italy, 6075d.
Vice-President, 6076a.
Viceroy, 6076c.
Viceroy butterfly, 4845d.
Vickers machine gun, 3563b.
Vicksburg, Miss., 6076c.
Victor Emmanuel II, 6077a.
Victor Emmanuel III, 6077c.
Victoria (Australia), 6078a.
Victoria, B. C., 6080b.
Victoria, Hong-kong, 2827c.
Victoria, Princess Royal, 6079c.
Victoria, Queen, 1958a, 2591d, 6079a.
Victoria Bridge, 5548a.
Victoria Cross, 6081b.
Victoria Falls, 6081d, 6215d.
Victoria Falls of the Iguazzu, 4490a.
Victoria Haven, 3332a.
Victoria Jubilee Bridge, 3935d.
Victorian Age in literature, 2057b.
Victoria Nyanza, 6082a.
Victoria Peaks, 6032d.
Victoriaville, Que., 6082a.
*Victory* (flagship), 4114b.
Vicuna, 3471a, 6082c.
Viderö Island, 2138c.
Vienna, Austria, 6082b.
Vienna, Congress of, 6084c.
Vienna, University of, 6084b.
Vigil, 1358a.
Vigilance committee, 3544c.
Viking boat, 4276c, 6183a.
Vikings, 4275c.
Vilaine River, 4971a.
Vilayet, 4521a.
Vili, 4043b.
Villa, Francisco, 1200d, 3772d, 6306a, 6084d.
Villa del Pilar, Paraguay, 4486b.
Villa Encarnaçion, Paraguay, 4486b.
Villafranca, Treaty of, 4067d.
*Village Blacksmith, The,* 289b, 4941a.
Village government, 4004b.
Villa Rica, Paraguay, 4486b.
Villeins, 6085b.
Ville Marie, 3936d.
Villi, 6085c.
Vilna, Russia, 6085c.
Vimeiro, Battle of, 4784c.
Viminal Hill, 5064a.
Vincennes, Ind., 2956a, 6085d.
Vincent, George Edgar, 6086b.
Vincent, John Heyl, 6086c.
Vinci, Leonardo da, 6086d.
Vinegar, 6087c.
Vineland the Good, 4249d.
Vine maple, 3643a.
Vinland, 6088a.
Viol, 6088b.
Violet, color plate, facing 2224, 6088c.
Violin, 6089a.
Violoncello, 6089c.
Viper, 6089c.
Viper fish, 3329d.
Virchow, Rudolf, 6089d.
Virchow hospital, 2845b.
Virden, Man., 6090c.
Vireo, 6090c.
Virgil, 6060d.
Virginia, 6091a.
Virginia, Minn., 6099d.
Virginia, University of, 6099d.
Virginia and Kentucky Resolutions, 3231c.
Virginia City, Nev., 6100a.
Virginia cowslip, 1620a, 3537d.
Virginia creeper, 6100b.
Virginia cress, 1632c.
Virginia Minstrels, 3837c.
Virginia natural bridge, 4078b.
Virginia nightingale, 1182d, 4235a.
"Virginia plan," 3580c, 5980d.
Virginia rail, 4915c.
Virginia redbird, 1182d.
Virginia reel, 1697b.
Virginia Resolutions, 3231c, 3581d.
Virginia snakeroot, 5420b.
Virgin Islands (British), 3370b.
Virgin Islands of the United States, 6100c.
Virgin Mary, 3669d.
Virginius Massacre, 6101b.
Virgin's bower, 1415b.
Virgo, 6101d.
Virtual image, 3380c, 3424b.
Virus, 6101d.
Vischer, Peter, 5276c.
Vischer's Ferry Dam, 4217b.
Viscount, 4550b, 6102a.
Viscount, Gian Galeazzo, 3795d.
Vise, 5270c, 6102a.
Vishnu, 6102b.
Visible writing, 5930c.
Visigoths, 2542d, 5477a.
Vision, 6102c.
Viso, Monte, 4717b.
Vistula River, 6102c.
Visual memory, 3729d.
Vital air, 4437b.
Vital knot, 892c.
Vitamines, 4318c.
Vitellius, 4426a.
Vitreous copper, 1574a.
Vitreous humor, 2118b.
Vitriol, 5621a.
Vivisection, 6102d.
Vizetelly, Frank H., 2051a.
Vizier, 6103a.
Vladimir, 3843c.
Vladivostok, Siberia, 6103c.
Vlakte-vark, 6184d.
Vocal cords, 5390c, 6109c.
Vocal Memnon, 1971a, 3727d.
Vocational education, 1943c.
Vocational guidance, 6103b.
Vocational schools, 5241d.
Vodka, 4835b, 6109a.
Vogelweide, Walther von der, 3826d.
Voice, 6109b.
Voice (grammar), 6056d, 6110a.
Volapük, 3325d, 6110b.
Volatile oils, 4357d.
Volcano, 6110c.
Vole, 6112c.
Volga River, 6112c.
Volo, Greece, 5789d.
Volo, Gulf of, 5789b.
Volscians, 3342c.
*Volsungasaga,* 5139d.
Volt, 239a, 6114c.
Volta, Alessandro, 6113a.
Voltage drop, 2003b.
Voltaic cell, 1981a.
Voltaire, Jean Francois Marie Arouet de, 6113a.
Voltmeter, 6114c.
Volume of a prism, 4827a.
Volume of a pyramid, 4877a.
Volume of a sphere, 5495a.
Voluntary bankruptcy, 575b.
Voluntary manslaughter, 3636d.
Voluntary muscles, 4011a.
Volunteer military system, 3799b.
Volunteers, 6114c.
Volunteers of America, 6115c.
Vomer, 2123c.
Vomiting, 6116a.
Von Goetzen, Admiral, 6153a.
Von Vissing, General, 674b.
Voragine, Jacobus de, 3371c.
Vorderrhein, 4994a.
Vor Frue Kirke, 1571a.
Vorticella, 6116b.
Vosges Mountains, 6116c.
Voss, Johann Heinrich, 6116c.
Vote and voting, 495b, 560c, 1977a.
Voting by proxy, 4852a.
Voting machine, 6116d.
Voting trust, 5891c.
Voussoirs, 318c, 921a.
Vowel, 6117c.
Vuelta Abaijo leaf, 5825c.
Vulcan, 6117c.
Vulcanizing, 5098d.
Vulgar Latin, 5054b.
Vulgate, 6118a.
Vulture, 6118b.
Vytegra River, 4376b.

# W

W, 6119a.
Wabash, Ind., 6119a.
Wabash River, 6119b.
*Wacht Am Rhein, The,* 6119d.
Waco, Tex., 6119d.
Wadaï, French Congo, 6120a.
Wagan River, 4979a.
Wager, 6120b.
Wages, 6120c.
Wagner, Wilhelm Richard, 6121c.
Wagon, 6122d.
Wagtail, 4682a, 6122d.
Wahunsonacook, 4304b.
Waiblingen, 2635a.
Wailing place of the Jews, 3142b.
Wainwright, Alta., 4506a.
Wairoa geyser, 4220b.
Waite, Morrison Remick, 5640a, 6123a.
Wake, 6123b.
Wakefield, Battle of, 1957a.
Wakefield, Mass., 6123b.
Wake-robin, 5879c.
Wakulla Spring, 2213d.
Waldeck-Rousseau, Pierre Marie René, 6123c.
Waldenses, 6123d.
Waldo, Peter, 6123d.
Waldseemuller, 6073b.
Wales, 6124a.
Wales, Prince of, 4821c.
Walfish Bay, 4921d.
Walhalla, 6125d.
Walker, Amasa, 6125d.
Walker, Sir [Byron] Edmund, 6126b.
Walker, Francis Amasa, 6126a.
Walker, Robert J., 4738b.
Walker, William, 4670a, 6126c.
Walker Act, 5704b.
Walkers, 5361c.
Walkerville, Ont., 6126d.
Walking delegate, 1473c.
Walking leaf, 3357a.

Walking Purchase, 4006b.
Walking stick, 6126d.
Wallace, Alfred Russel, 6127a.
Wallace, Lewis, 6127d.
Wallace, Sir William, 6128a.
Wallaceburg, Ont., 6128b.
Wall arcade, 317d.
Walla Walla, Wash., 6128c, 6190c.
Wall-eyed pike, 4584a, 4672a.
Wallenstein, Albert Eusebius Wenzel von, 6128d.
Wallflower, 6129d.
Wallingford, Conn., 6129d.
Wall knot, 3270d, 5504a.
Wall of 10,000 Li, 1348c.
Wallpoons, 666b, 6130a.
Wallowa Mountains, 4403c.
Wall paper, 6130a.
Wall Street, 4206b.
Walnut, 6130c.
Walpole, Horace, 2580b, 4685a, 6131b.
Walpole, Sir Robert, 6131c.
Walrus, 6132a.
Walter, John, 4186d.
Waltham, Mass., 6132b.
Walther, Bernard, 4330c.
Walton, Izaak, 6133a.
Waltz, 1697a, 6133b.
Wampanoag Indians, 6133c.
Wampum, 4572d, 6133c.
Wanamaker, John, 6134a.
Wandering Jew, 6134b.
Wandering Jew (plant), 6134c.
Wapiti, 2013d, 6134d.
War, 6134d.
War, Prisoners of, 4829a.
War at sea, Rules for, 3020c.
Warbeck, Perkin, 6136c.
Warblers, 6136c.
War-bonnet, Apache, 289d.
Ward (law), 6137a.
Ward (politics), 1515b, 6137b.
Ward, Artemus, 955c.
Ward, Edward J., 1517b.
Ward, Elizabeth Stuart Phelps, 6137d.
Ward, Mrs. Humphry, 6138a.
Ward, John Quincy Adams, 5277b, 6138b.
Ward, Powers of a, 2631d.
War Department, 6138c.
Warden (Canada), 3707a.
Warden, Prison, 4827d.
Ward's Natural Science Institute, 5716a.
War eagle, 1897c.
Warfield, David, 6139a.
War galley, 6181b.
War galley of Northmen, 4276a.
War game, 6139b.
Warm houses, 2617c.
Warner, Charles Dudley, 6139c.
Warner, Seth, 6139d.
Warning lizard, 3890a.
War of 1812, 3582c, 6140a.
War of Secession, 3441a, 6144a.
War of the Austrian Succession, 2330a.
War of the Grand Alliance, 2329b.
War of the Nations, 803c, 6151a.
War of the Spanish Succession, 2329d, 4630a.
War of the Three Henries, 2866c.
War on land, Rules for, 3020b.
Warp, 1437c, 6233c.
Warrant, 6179a.
Warranty deed, 1738c.
Warren, Joseph, 998d, 4982d, 6179b.
Warren, O., 6179c.
Warren, Pa., 6179c.
Warren River, 4997b.
Warrens, 4906d.
Warsaw (fish), 3148d.
Warsaw, Poland, 6179d.
War shields of savages, 5352a.
Warship, 6180b.
Wars of the Roses, 2046a, 5083a.
Wart, 6184c.
Wart hog, 6184c.
Warwick, R. I., 6185a.
Warwick, Richard Neville, Earl of, 6185a.
War zone, Submarine, 6169d.
Wasatch Mountains, 6185c.
Wasco Indians, 6185c.
Waserhorn, Mount, 5151d.
Washburne, Elihu Benjamin, 6185d.
Washerwoman's itch, 3087a.
Washing soda, 5429b.
*Washington*, 4453.
Washington (city), 1810c, 6193b.
Washington (state), 6186a.
Washington, Augustine, 6199b.
Washington, Booker Taliaferro, 6198c.
Washington, George, 6199a.
Washington, George, bookplate, 829a.
Washington, Lake, 5285b.
Washington, Lawrence, 6200c.
Washington, Martha, 6208b.
Washington, Mount, 293c, 4155d, 6274d.
Washington, Pa., 6208c.
Washington, Treaty of, 6208d.
Washington, University of, 6209a.
Washington and Lee University, 6209a.
Washington Arch, 4206d, 6209b.
*Washington Crossing the Delaware*, 4453.
Washington District, 6211a.
Washington eagle, 1897c.
Washington Elm, 4986d, 6209c.
Washington hand printing press, 4825a.
Washington Island, 3790c.
Washington Monument, 6209c, 6215d.
"Washington of South America," 795c.
Washington palm, 4461d.
Washington Peace Conference, 1254b.
Washington's birthday, Program for, 6206a.
Washington's rules of conduct, 2085b.
Washington University, 6210b.
Washita River, 6210c.
Wasp, 6210d.
Watauga Association, 5754b, 6211a.
Watch, 6211a.
"Watchdog of the Treasury," 6185d.
Watchful waiting, 6304c.
*Watch on the Rhine, The*, 6119d.
Watchung Mountain, 4395b.
Water, 464a, 2243c, 2434d, 6213b.
Water, Consumption of, per person, 6222d.
Water, Dispersal of seed by, 5293d.
"Waters, Father of," 2142a.
*Water Babies, The*, 3258d.
Water beetle, 6214c.
Waterberg Range, 5863b.
Water boatmen, 6214c.
Water-bound macadam, 5029b.
Water buffalo, 981c.
Water bug, 6214c.
Waterbury, Conn., 6215a.
Water-carriage sewerage system, 5321c.
Water chinquapin, 3506b, 4115c.
Water colors, 4447a, 6215c.
Water cress, 1632c.
Water dog, 3994d.
Water dust, 4921c.
Waterfall, 6215c.
Water flea, 1701d.
Water gaps, 6022d.
Water gas, 2402b.
Water hemisphere, 4332c.
Water-hen, 2366a.
Water-lily, color plate, facing 2224, 6216b.
Water lily bud, 976b.
Waterloo, Battle of, 780b, 2168a, 6216d.
Waterloo, Ia., 6217c.
Waterloo, Ont., 6216b.
Water-measuring earth-star, 4014d.
Watermelon, 6217d.
Water mirage, 3840d.
Water moccasin, 1574b.
Water motor, 5904b.
Water ouzel, 1801b, 4432b.
Water plants, 6218a.
Water polo, 4744b.
Water power, 6218c.
Water power of Niagara Falls, 4226a.
Water power of the world, 6219c.
Water-pressure engines, 2885b.
Waterproofing, 6220a.
Waterproof paper umbrellas, 6220b.
Water purification, 2173c.
Water rail, 4915c.
Water roots, 5078c.
Watershed, 1812a, 6220b.
Water shrew, 5364d.
Water skaters, 6214d.
Waterspout, 6220c.
Water supply, Home - made, 6223a.
Water supply of cities, 2887a.
Water table, 1850d, 2435a.
Water test, 4711b.
Waterton Lakes Park, 4504c, 4506d.
Watertown, Mass., 6220d.
Watertown, N. Y., 6221a.
Waterville, Me., 6221b.
Watervliet, N. Y., 6221b.
Water vole, 6112c.
Water wheel, 6221c.
Waterworks, 6222a.
Watling's Island, 6358d.
Watrous, Sask., 6223c.
Watson, John, 6223c.
Watson, Thomas E., 4762c, 6223d.
Watt (electricity), 6224a.
Watt, James, 6224b.
Watteau, Antoine, 6224d.
Watterson, Henry, 6225a.
Watts, George Frederick, 6225c.
Watts, Isaac, 6226a.
Watt's governor, 2547c.
Wat Tyler's rebellion, 5928d.
Waukegan, Ill., 6226a.
Waukesha, Wis., 6226c.
Wausau, Wis., 6226c.
Waves, 6226d.
Waves, Power in, 6220a.
Waves, Sound, 5444b.
*Waverley Novels*, 5267c.
Wavy hair-grass, 2576d.
Wax, 6227a.
Waxed paper, 4481a.
Wax myrtle, 1152d.
Wax palm, 4462d, 6227b.
Waxwing, 6227c.
Way bills, 719a.
Waycross, Ga., 6227c.
Wayne, Anthony, 6227d.
Ways and Means Committee, 1538b.
Wayside, 2725d.
Wazir, 6103a.
Weak verbs, 6056d.
Wealth, 6228a.
Wealth, Distribution of, 1918a.
*Wealth of Nations, The*, 5412b.
*Wearin' o' the Green*, 3055d.
Weasel, 6228d.
Weaser, 3745d.
Weather, 1430b.
Weather bureau, 106a, 6229a.
Weather flags, 6230b.
Weathering, 2433d, 5431a.
Weather map, 6230c, 6321a.
Weather-wells, 4102b.
Weaver, James Baird, 6232b.
Weaver bird, 6232d.
Weaver's knot, 3270a.
Weaving, 6233b.

Weaving of silk, 5383a.
Webb City, Mo., 6234b.
Webb-Kenyon law, 4834a.
Weber, Constanza, 3994a.
Weber, Karl Maria Friedrich Ernest von, 6234c.
Weber River, 6011c.
Web-footed State, 4410b.
Web of the spider, 5498a.
Web rotary press, 4186c.
Webster, Daniel, 6235a.
Webster, Mass., 6237a.
Webster, Noah, 6236d.
Webster, Sir Richard, 219b.
Webster - Ashburton Treaty, 6237b.
*Webster's Dictionary*, 38c.
Wedding ring, 5020d.
Wedge, 3714c, 6237c.
Wedge-shaped leaf, 3361a.
Wedgwood, Josiah, 6238a.
Wedgwood ware, 6237c.
Wednesday, 6238b.
Weed, Thurlow, 6238b.
Weeds, 859a, 6238c.
Weejack, 2628a.
Week, 6239c.
Weeper monkeys, 5204b.
Weeping willow, 6296d.
Weevil, 6239d.
Weighing scale, 6240b.
Weight, 6241a.
Weight of air, 117c.
Weight on the moon's surface, 3940a.
Weights, Molecular, 3837c.
Weights and measures, 6241b.
Weir net, 4122c.
Weitzel lock, 5222d.
Welding, 1998d.
Welding machine, Electric, 1999b.
Welf, 2635a.
Welland, Ont., 6241c.
Welland Canal, 6241d.
Well boring, 6242b.
Welles, Gideon, 6242d.
Wellesley, Mass., 6243a.
Wellesley, Province of, 4557b.
Wellesley College, 6243a.
Wellington, Duke of, 6243c.
Wellington, N. Z., 6243b.
Wellman, Walter, 4728c.
Wells, David Ames, 6244c.
Wells, Herbert George, 6244c.
Wells, Dr. Horace, 253a.
Welsbach, Karl Auer, 6244d.
Welsbach gas burner, 6245a.
Welsh accent, 4840d.
Welwitschia, 6245a.
Wener, Lake, 5646c.
Wentworth, Thomas, 5583a.
Wergeland, Henrik, 4283b.
Wergild, 777b.
Werner I, 2687b.
Weser River, 6245b.
Wesley, Charles, 6246b.
Wesley, John, 6245c.
Wesleyan Methodist Church, 3756c, 6246c.
West, Benjamin, 6246d.
West, Thomas, 1748b.
West Antarctica, 277a.
Westbrook, Harriet, 5346b.
West Chester, Pa., 6247a.
Westerly winds, 6309d.
Western Australia, 6247b.
Western hemisphere, 2766b.
Western hemlock, 2767a.
Western Isles, 2756a.
Western larch, 3333d.
Western Reserve, 1550c, 6248a.
Western Reserve University, 6248a.
Western tanager, 5696c.
Western Union Telegraph Company, 5742a.
Westfield, Mass., 6248b.
West Hoboken, N. J., 6248c.
West Indies, 6248d.
West Indies, Danish, 6249b.
Westinghouse, George, 118d, 6249b.
Westminster Abbey, 3488a, 4720d, 6249d.
*Westminster Confession of Faith*, 1630c, 4810b.
Westminster Hall, 6250b.
Westmount, Que., 6250b.
West Orange, N. J., 6250c.
West Palm Beach, Fla., 4463d.
West Palm Beach Canal, 1147b.
Westphalia, 6250c.
Westphalia, Peace of, 4457c, 5792c, 6250d.
West Point cadets, 3797d.
West Point examinations, 3797c.
West Spitzbergen, 5503b.
West Springfield, Mass., 6251c.
Westville, N. S., 6251c.
West Virginia, 6251b.
West Virginia, University of, 6258d.
*Westward Ho!*, 3258c.
West Wind Drift, 2639c.
Wetaskiwin, Alta., 6259a.
Wet chinook, 1356d.
Wetherald, Agnes Ethelwyn, 6259a.
Wet monsoons, 3902c.
Wet process (metallurgy), 428c, 3751b.
Wet-salting of ham, 2672d.
Wet steam, 5538d.
Wetter, Lake, 5646c.
Weyburn, Sask., 6259b.
Weyer's Cave, 6099a.
Weyler, Nicolau Valeriano, 6259c.
Weyman, Stanley [John], 6259d.
Weymouth, Mass., 6260a.
Whale, 6260a.
Whalebone, 1257b, 6260c.
Whale horse, 6132a.
Whale oil, 6269b.
Whale-oil soap, 3002b.
Whale shark, 5337d.
Whaling, 4140d, 6260d.
Wharf, 1825b.
Wharton, Edith [Jones], 6261a.
Wharton, Francis, 6261c.
*What Does Little Birdie Say?*, 3319b.
Wheat, 2553d, 6261b.
Wheat grass, 1611d.
Wheatless day, 6177c.
Wheat midge, 6264b.
Wheat smut, 5418a.
Wheat starch, 5530c.
Wheatstone, Sir Charles, 6264c.
Wheel, 6264d.
Wheel and axle, 3714a, 6265a.
Wheeler, Benjamin Ide, 6265b.
Wheeler, Joseph, 6265c.
Wheeler, Mount, 4134a.
Wheeler, Seager, 5087a.
Wheeler, William Almon, 6265d.
Wheeling, W. Va., 6266a.
Wheel window, 5083d.
*Where Go the Boats?*, 3321d.
Whig, 4735a, 6266c.
Whiggamore, 6266c.
Whig junta, 3190c.
Whip grafting, 2550c.
Whipple, Henry Benjamin, 6267c.
Whip-poor-will, 6268a.
Whirligig, 6214c.
Whirlpool, 6268b.
Whirlpool, Niagara, 4224b.
Whirlpool cableway, 4225a.
Whirlwind, 6268b.
Whisky, 168a, 6268c.
Whisky insurrection, 6268d.
Whisky jack, 3127c.
Whisky ring, 6269a.
Whist, 6269b.
Whistle buoy, 1000c.
Whistler, James Abbott McNeil, 6269d.
Whistler's *Mother*, 4453.
Whistling swan, 5643c, 5644a.
Whitby, Ont., 6270d.
White, 6270d.
White, Andrew Dickson, 6271a.
White, Carolina, 116d.
White, Edward Douglass, 6271b.
White, Gilbert, 6271c.
White, Hugh L., 6028d.
White, Richard Grant, 6271d.
White, Stewart Edward, 6271d.
White, William Allen, 6272b.
White, Sir William Thomas, 6272c.
White agate, 1259d.
White alkali, 202b.
White ant, 5760c.
White arsenic, 389c.
White ash, 409c.
White-backed skunk, 5402a.
Whitebait, 2787b.
Whitebait dinner, 2621a.
White bay, 632a.
White birch, 728d.
White blackberry, 1001c.
White Book, 781d, 782a.
White-breasted nuthatch, 4314c.
White burley tobacco, 5823d.
White bush squash, 2545d.
Whitecaps, 6272c.
"White City," 6359a.
White clover, 1440a, 5336c.
White-crowned sparrow, 5481d.
Whiteface, Mount, 54a.
White-faced hornet, 2838b.
Whitefield, George, 4148d, 6276d.
Whitefish, 6273b.
White flag, 6271a.
White-fronted sapajou, 5204b.
White gold, 4701d.
Whitehead torpedo, 5841c.
White hellebore, 2764a.
White House, 6273d.
White House Conference, 1552c.
White ibis, 2901b.
White laurel, 3596b.
White lead, 3355d, 6274b.
White-lipped peccary, 4546b.
White magic, 4109a.
White man's grave, 2325b.
White-marked moth, 5922b.
White Mountain, Battle of, 5791c.
White Mountains, 6274c.
White mulberry, 3996b.
White mustard, 4037c.
White oak, 4323a.
White oakum, 4325c.
White of egg, 1960d.
*White Paper*, 782a.
White peanut, 4540d.
White pelican, 4553c.
White peony, 4577c.
White pepper, 4578d.
White pickerel, 4034a.
White pine, 4677c.
White pine cone, 1529b.
White plague, 5895c.
White Plains, Battle of, 6275c.
White Plains, N. Y., 6275b.
White poplar, 4759d.
White rhinoceros, 4995b.
White River, Ark., 6275d.
White River, Ind., 6275d.
White Sea, 6276a.
White semiporcelain ware, 6237d.
White shark, 5337d.
White stork, 5562c.
White sturgeon, 5596a.
White Sulphur Springs, 3818d.
White-throated sparrow, 5481d.
White top, 6093b.
White walnut, 1027b.
White wampum, 6133d.
White weed, 1690c.
White wheat, 6262c.
White willow, 6296c.
White wolf, 6343d.
White Woman Mountain, 3767d.
Whitewood, 619b.
Whiting, 1260c, 2664a.
Whitlock, Brand, 6276a.
Whitman, Marcus, 6276c.
Whitman, Walt, 6276d.
Whitman Monument, 6190c.
Whitney, Adeline Dutton Train, 232b, 6277b.
Whitney, Eli, 1610b, 6277c.
Whitney, Sir James Pliny, 6278a.
Whitney, Josiah Dwight, 6278d.

Whitney, Mount, 1057b, 6278c.
Whitney, William Collins, 6278b.
Whitsunday, 4576c.
Whittier, John Greenleaf, 6278d.
Whole note (music), 4023c.
Whole-wheat flour, 2222a.
Whooping cough, 6280b.
Whooping crane, 1623b.
Whortleberry, 2858a.
Whydah, 1687d.
Whymper, Edward, 3699a.
Wiche Islands, 5503b.
Wichita, Kans., 6280c.
Wichita Falls, Tex., 6281a.
Wichita Mountains, 4359d.
Wicker work, 616a.
Wiclif, John, 6366b.
Widgeon, 6281a.
Wieck, Clara, 6250d.
Wieland, Christoph Martin, 6281b.
Wien, Austria, 6082b.
Wiesbaden, Prussia, 6281d.
Wife, Husband and, 2879a.
Wife's dower right, 2880a.
Wiggin, Kate Douglas, 5018c.
Wight, Isle of, 6282a.
Wigs, 2660d.
Wigwagging, 5377d.
Wilberforce (family), 6282b.
Wilburites, 4884a.
Wilcox, Ella Wheeler, 6282d.
Wild ass, 2841c.
Wild barley, 6283b.
Wild canary, 227c, 1149d.
Wild carrot seed, 6238c.
Wild cat, 6283b.
Wildcat banks, 6283c.
Wild Cat Mountain, 4101d.
Wilde, Oscar Fingall O'Flahertie Wills, 6283d.
Wilderness, Battle of the, 6284b.
Wilderness, Hebrews in the, 3963c.
Wildfire, 2610d.
Wild geranium, 2462d.
Wild ginger, 2495a, 5420b.
Wild laurel, 5003b.
Wild mustard seed, 6238b.
Wild rice, 5008a.
Wild rice men, 3734a.
Wild rose bud, 976b.
Wild sheep, 5341b.
Wild turkey, 5916d.
Wild west show, 1308c, 1461a.
Wiley, Calvin Henderson, 4259d.
Wilhelmina, Queen, 6284c.
Wilhelmshaven, Prussia, 2686b.
Wilkes, Charles, 6284c.
Wilkes-Barre, Pa., 6284d.
Wilkie, Sir David, 6285c.
Wilkie, Sask., 6285c.
Wilkins, Mary Eleanor, 2323d.
Wilkinsburg, Pa., 6285d.
Will (law), 6286a.
Will (psychology), 6286c.
Will, Breaking the, 6288d.
Willamette River, 6288d.
Willamette Valley, 4403b, 6187b.
Willapa Bay, 6187b.
Willard, Emma C. Hart, 6289a.
Willard, Frances Elizabeth, 6289b, 6346b.
Willard, Jess, 4830d.
Willard Rest Cottage, 6346b.
William, Prince of Wied, 147a.
William I, the Conqueror, 4247d, 6289c.
William II, III, IV (England), 6290c.
William I, II (Germany), 2479b, 6291b, 6291d.
William and Mary, 3107d.
William and Mary College, 4619d, 6294a.
William of Orange, 3397c, 6290d, 6293d.
Williams, Ephraim, 6295a.
Williams, George, 6400c.
Williams, John Sharp, 6294c.
Williams, Roger, 4850b, 4999b, 6294c.
Williamsburg Canal, 1147b.
Williamsburg suspension bridge, 4898a.
Williams College, 6295a.
Williamson camera, 3989d.
Williamsport, Pa., 6295b.
William the Conqueror, 4247d, 6289c.
William the Lion, 5261d.
William the Silent, 6293d.
Willibroek Canal, 962d.
Willimantic, Conn., 6295c.
Willis, Nathaniel Parker, 6295d.
Willison, Sir John Stephen, 6296a.
Will-o'-the-Wisp, 2918b.
Willoughby Lake, 6063d.
Willow, 6296c.
Willow-leaved spiraea, 5501a.
Willson, Beckles, 1142d.
Wilmington, Del., 6297a.
Wilmington, N. C., 6297d.
Wilmot, David, 6298d.
Wilmot, Lemuel A., 6298c.
Wilmot Proviso, 4739d, 6298c.
Wilson, A. B., 5328d.
Wilson, Alexander, 3263a.
Wilson, Augusta Jane, 6299a.
Wilson, Sir Daniel, 1143c, 6299a.
Wilson, Eleanor, 6308d.
Wilson, Henry, 6299b.
Wilson, James, 6299c.
Wilson, Jessie, 6308d.
Wilson, John (author), 6299d.
Wilson, John (missionary), 6300a.
Wilson, Joseph Ruggles, 6301a.
Wilson, Margaret, 6308d.
Wilson, Mount, 4520b.
Wilson, William Lyne, 6300c.
Wilson, Woodrow, 4823b, 6300b, 6171a, 6173b.
Wilson Peak, 5935d.
Wilson's petrel, 4610d.
Wilson's snipe, 5420d.
Wilson tariff bill, 1424a.
Wilt, 1608b.
Wilton rug, 1199d.
Winchell, Alexander, 6308d.
Winchester, Mass., 6309a.
Winchester magazine rifle, 5017b.
Winchester repeating rifle, 5410a.
Wind, 6309b.
Wind (factor in climate), 1431b.
Wind (in geology), 2434a.
*Wind and the Sun, The*, 5566a.
Wind avalanche, 519a.
Wind Cave National Park, 4505d.
Wind dispersal of seed, 5293b.
Windhover, 3233b.
Windlass, 6265b, 6311b.
Wind load, 986d.
Windmill, 6222b, 6311c.
Window, 6311d.
Window glass, 2508b.
Window tax, 6311d.
Windpipe, 5853d.
Wind River Range, 6369a.
Winds of the ocean, 6309b.
Windsor, N. S., 6312a.
Windsor, Ont., 6312b.
Windsor Castle, 1956a, 6312d.
Windsor green granite, 6064d.
Windward Islands, 6313a.
Windward Passage, 2662a.
"Windy City," 1312b.
Wine, 6313b.
Winfrid, 811a.
Winged bull, 6313c.
Winged lion, 6313d.
Winged pea, 5873a.
Winged rockets, 5042d.
*Winged Victory*, 6314a.
Wingless Victory, Temple of, 4237b.
Wing of butterfly, 1022d.
Wing of sparrow, 5481d.
Winifred, Saint, 6314c.
Winkel of Amsterdam, 3761a.
Winkelried, Arnold, 5664a, 6314c.
Winking membrane, 731a.
Winnebago, Lake, 6331d.
Winnebago Indians, 6314d.
Winnepesaukee, Lake, 4156c.
Winnepesaukee River, 3748a.
Winnipeg, Lake, 6316b.
Winnipeg, Man., 6315a.
Winnipegoos, Lake, 6316d.
Winnipegosis, Lake, 6316c.
Winnipeg River, 6317a.
Winona, Minn., 6317a.
Winslow, John Ancrum, 6317b.
Winston Salem, N. C., 6317c.
Winter, William, 6317d.
Winterberry, 6318a.
Winterbloom, 6342a.
Winter chippy, 5482a.
Winter cress, 1632c.
Wintergreen, 4579a, 6318a.
Winter Palace, 4612d, 6318b.
Winter port of Canada, 5153a.
Winter sleep, 2791a.
Winter squash, 5516c.
Winter stories, 5576c.
Winter tare, 5702a.
Winter wheat, 6262c.
Winter wren, 6361d.
Winthrop, John, 6318c.
Winthrop, Mass., 6318d.
Wire, 6319a.
Wire glass, 6319c.
Wire-grass, 2576c.
Wireless telegraph, 6320a.
Wireless telephone, 6325d.
Wire nails, 4056d.
Wire rope, 5078b.
Wireworm, 1428d, 6329a.
Wirt, William (educator), 2397d.
Wirt, William (politician), 284b, 2397d.
Wisconsin, 4281b, 6329a.
Wisconsin, University of, 6330b, 6338a.
"Wisconsin idea," 6330b.
Wisconsin River, 6338d.
Wisdom of Solomon, 5436a.
Wishart, George, 3271c.
Wisniowiecki, Michael, 3156a.
Wistar, Caspar, 6339a.
Wistaria, 6339a.
Wister, Owen, 6339a.
Witchcraft, 3698b, 6339c.
Witch hazel, 2736d, 6341d.
Witenagemot, 6342a.
Wittenberg, University of, 2669d.
Witherspoon, John, 6342b.
Witness, 6342c.
Witte, Sergei Yulievitch, 6342d.
Wittenberg, Prussia, 6343a.
Witwatersrand, South Africa, 5863b.
"Wizard," The, 1925b.
Woad, 6343b.
Woburn, Mass., 6343b.
Wodin, 4342d.
Wold wolle, 4679b.
Wolf, 6343c.
Wolf berry, 1623a.
Wolfe, James, 4896d, 6344a.
Wolfe and Montcalm Monument, 4896c.
Wolf fish, 6344c.
Wolfmonth, 3114b.
Wolf tribe (Indians), 4006b.
Wollaston, William H., 4461a.
Wollaston Lake, 5211b.
Wolseley, Garnet Joseph, 4955a, 6344d.
Wolseley, Sask., 6344d.
Wolsey, Thomas, 6345b.
Wolverine, 2515c, 3785b.
Wolverine State, 3780b.
*Woman of the Confederacy Monument*, 4263a.
Woman's Christian Temperance Union, 4833c, 6346a.
Woman's Relief Corps, 6346b.
Woman suffrage, 4288c, 6346c, 6347b.
Woman suffrage in Canada, 6348b.
Wombat, 6348d.
Women police, 4732d.
Women's club, 6349a.
Women suicides, 5618d.

Won-san, Chosen, 1364b.
Wood, Leonard A., 3799a, 6350a.
Wood alcohol, 6350b.
Wood anemone, 5545c.
Woodbine, 2827b, 6100b.
Woodbury, Levi, 4665a.
Wood carving, 507d, 6350c.
Woodchuck, 2627d.
Woodcock, 6351a.
Woodcock, Catharine, 3810d.
Woodcraft Indians, 884b.
Wood duck, 1873d.
Wood engraving, 2058b, 6351c.
Wooden Horse, 5888a, 6351d.
Wood-Gatherer, 1088d.
Wood-hoopoe, 2831d.
Woodfall. Henry Sampson, 3190a.
Woodmen of the World, 2318d.
Wood partridge, 4519b.
Wood pavement, 5029d.
Woodpecker, 6352b.
Wood pewee, 6353a.
Wood-pulp paper, 4480b.
Wood saw, 5227c.
Woods Indians, 2963b.
Wood sorrel, 5336d.
Wood spirit, 6353b.
Woodstock, N. B., 6353b.
Woodstock, Ont., 6353c.
Wood tar, 5701a.
Wood thrush, 5803d.
Woodward, Calvin A., 3638a.
Woody nightshade, 755c, 4236c.
Woof, 1437c, 6233c.
Wool, 6353d.
Wool, Adulteration of, 63c.
Woolflower, 6355c.
Woolsey, Theodore Dwight, 6355d, 6380d.
Wool type sheep, 5341d.
Wool wax, 6227b.
Woolworth building, 4208b.
Woonsocket, R. I., 6356a.
Wopsononoc Mountain, 216d.
Worcester, Mass., 6356b.
Worden, John Lorimer, 6356d.
Wordsworth, William, 6357a.
Work, 3416d.
Workers in various fields, Relative proportion of, 6105b.
Workmen's compensation laws, 2028b, 6358d.
Work of raindrops, 4921c.
Works of Shakespeare, 5334a.
*World Illustrated, The*, 1509c.
World languages, 3326a.
World's Alliance (Presbyterian), 4810b.
World's Christian Endeavor Union, 1367b.
World's Columbian Exposition, 6358d.
World's famous paintings, 4450a.
World's Parliament of Religions, 6359d.
World's prize-fight championships, 4830c.
World's republics in 1776, 4975b.
World's republics in 1917, 4976b.
World War, 6151a.
Worms (parasites), 6360a.
Worms (vermes), 6360c.
Worms, Diet of, 3539d.
Worms, Germany, 6360b.
Wormseed, 2636c.
Worm wheel, 5270c.
Wormwood, 6360d.
Worsted, 6360d.
Wort, 916d, 1810a, 6386b.
Worthless checks, 1289b.
Wounded Knee, Battle of, 5467d.
Wounds, 6361a.
Wrangell, Mount, 136b.
Wren, 6361c.
Wren, Sir Christopher, 6249d, 6294b, 6361d.
Wrench, 6362b.
Wrestling, 6362c.
Wrigglers, 3965d.
Wright, Carroll Davidson, 6363a.
Wright, Harold Bell, 6363b.
Wright, Lemuel, 4676a.
Wright, Orville, 2236a.
Wright, Wilbur, 2236a, 6363c.
Wrinkled-seeded pea, 4534a.
Wrist watch, 6211b.
Writ, 6363d.
Writer's cramp, 4131c.
Writing, 6364a.
Writing (Montessori Method), 3923a.
Writ of Assistance, 4426a, 6364c.
Writ of error, 293d.
Writ of personal liberty, 2652b.
Written law, 5537b.
Wrought iron, 3059b.
Wryneck, 6364d.
Wundt, Wilhelm, 4860c.
Wuotan, 4342d.
Württemberg, Germany, 6364d.
Würzburg, Bavaria, 6365b.
Wu Ting-Fang, 6365c.
Wyandotte, 2877d.
Wyandotte, Mich., 6365d.
Wyandotte cave, 1241d, 6366a.
Wyandotte Indians, 2877d.
Wycliffe, or Wiclif, John, 6366b.
Wyoming, 6367b.
Wyoming, University of, 6373d.
Wyoming Valley massacre, 6374a.
Wyss, Johann Rudolf, 6374c.
Wythe, George, 6374c.

# X

X, 6375a.
Xanthippe, 5428d, 6375a.
Xavier, Francisco de, 6375b.
Xenia, O., 6375d.
Xenon, 1295a.
Xenophon, 6376a.
Xerxes, 4393b, 4696c, 6376c.
Xerxes, II, 6376d.
Ximenes, Francisco, 6377a.
Xingu, 6377b.
X-Rays, 5048b.
Xylophone, 6377b.
X Y Z Correspondence, 6377b.

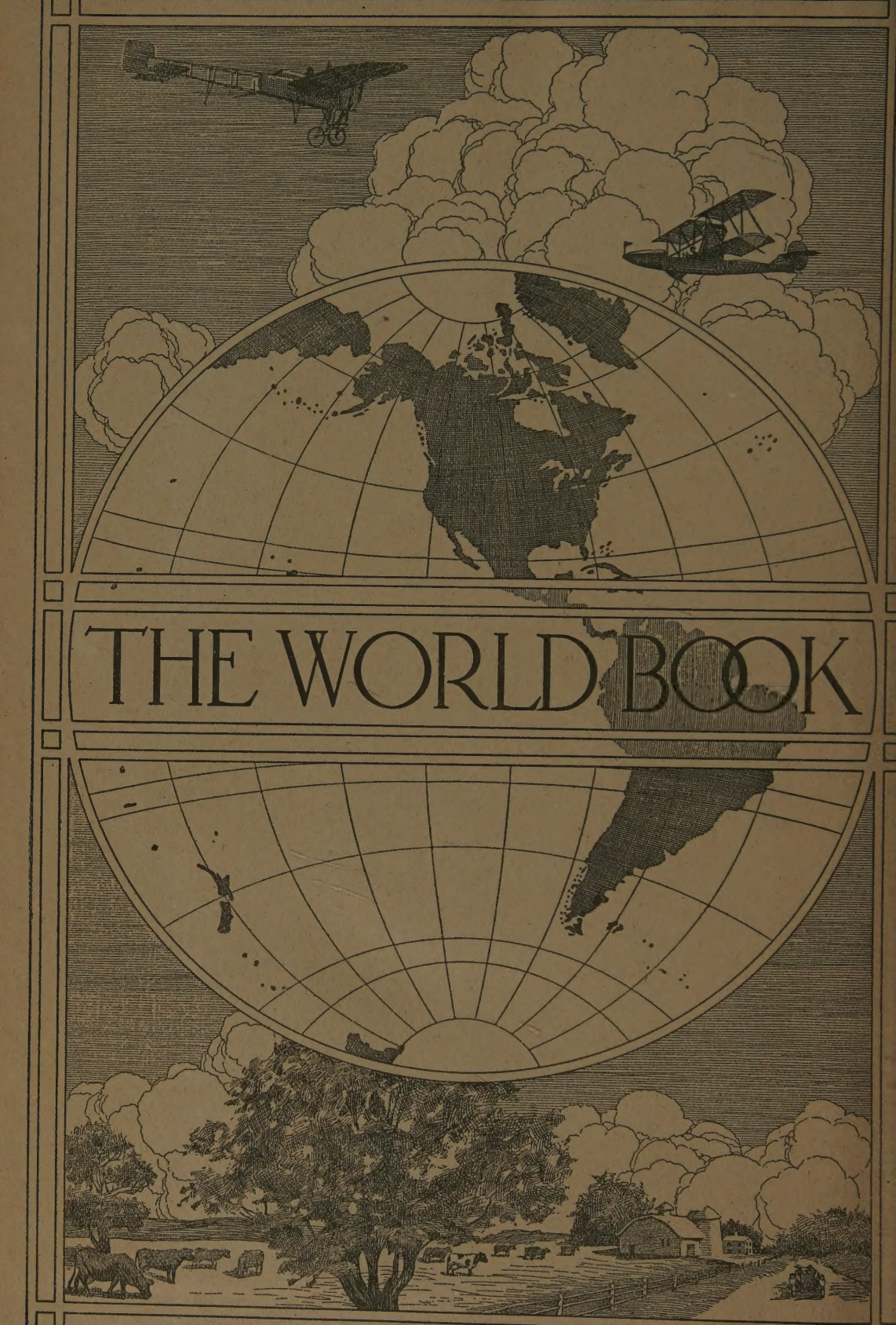
# Y

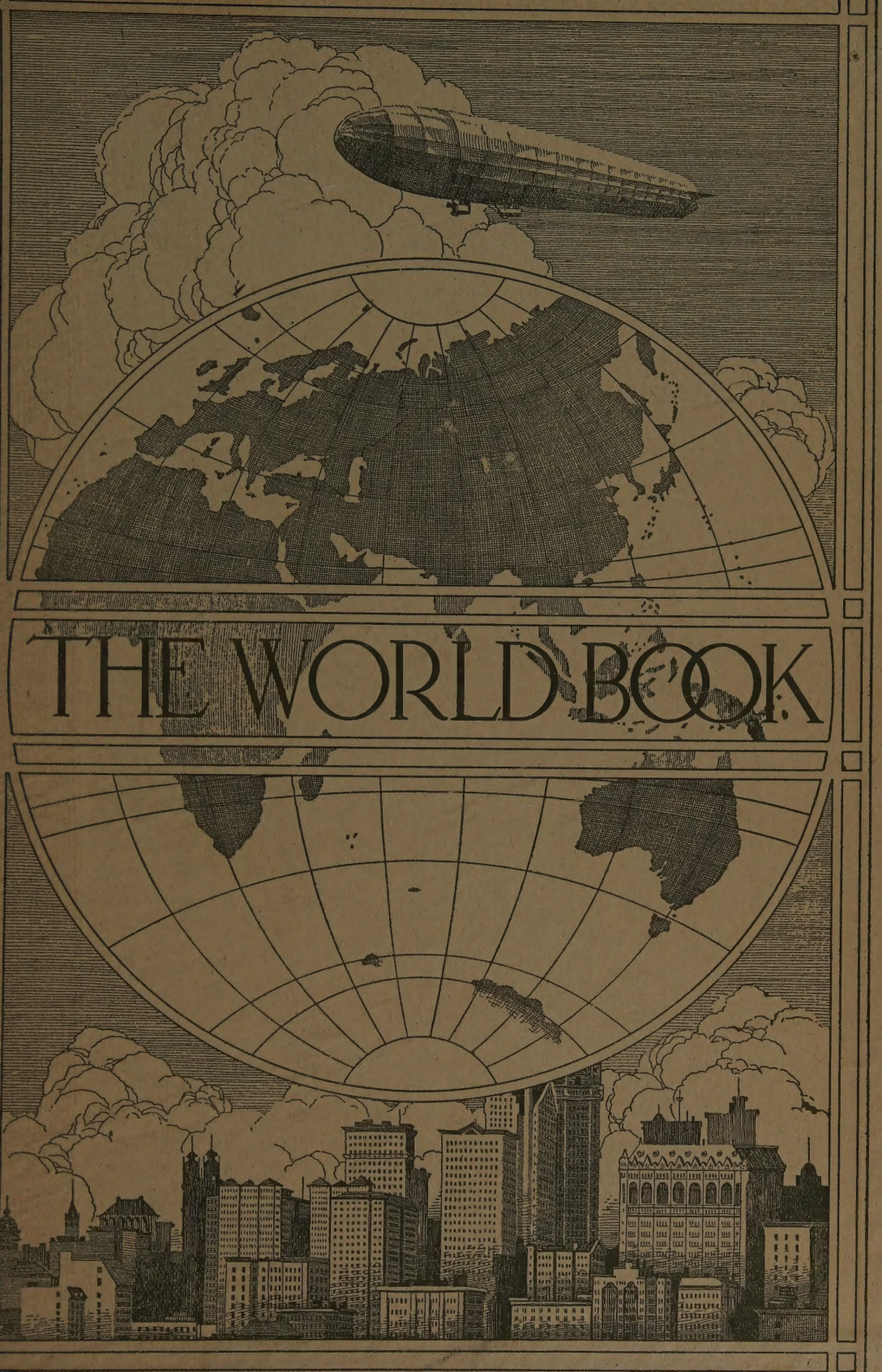
Y, 6378a.
Y (bay), 6378a.
Yablonoi Mountains, 6378b.
Yacht and yachting, 6378c.
Yacireta Island, 4485d.
Yafa, Syria, 3103d.
Yaghan hut, 1338a.
Yahweh, 3150a.
Yaila Mountains, 5114a.
Yajur-Veda, 6041d.
Yak, 6379b.
Yakima, 6379d.
Yakima project, 6188b.
Yakumo Koizumi, 2743d.
Yakuts, 3379c.
Yale, Elihu, 6380a.
Yale Bowl, 5518a, 6381c.
Yale University, 6380b.
Yalu River, 6381c.
Yalu River, Battle of, 5127a.
Yam, 6381d.
Yancey, William Lowndes, 129d, 6382a.
Yang-tse-kiang River, 6382d.
Yankee, 6383a.
*Yankee Doodle*, 6383b.
Yankton, S. D., 6383d.
Yaqui Indians, 6384a.
Yard, 3760c.
Yarkand, Turkestan, 6384b.
Yarmouth, Eng., 6384d.
Yarmouth, N. S., 6384c.
Yarmouth bloaters, 2787b.
Yarra River, 3725a.
Yass-Canberra District, 490c.
Yasyrenta Island, 4485d.
Yates, Richard, 6385a.
Yathrib, Arabia, 3872b.
Yat Sen, Dr., 1352c.
Yawl (ship), 6378d.
Yazoo Delta, 3845c.
Yazoo River, 6385a.
Year, 6385b.
Yeast, 6385d.
Yeast bread, 910a.
Yeats, William Butler, 6386c.
Yecchio, Palma, 4449b
Yedo, Japan, 5828b.
Yellow, 6386d.
Yellow-bellied sapsucker, 5204d.
Yellow birch, 728a.
Yellowbird, 227c.
Yellow brass, 897c.
Yellow bunting, 6387b.
Yellow clover, 1440a.
Yellow crocus, 1642c.
Yellow daisy, 758a.
Yellow fever, 6387a.
Yellow-fever mosquito, 3967d.
Yellow flag, 4884d.
Yellow Hair, 1677a.
Yellow-hammer, 6387b.
Yellow-headed parrot, 4514a.
Yellow jacket, 6387c.
Yellow jasmine, 2412c.
Yellowlegs, 6387d.
Yellow locust, 3482a.
Yellow moccasin flower, 3295b.
Yellow nelumbo, 4115c.
Yellow ocher, 4337a.
Yellow perch, 4584a.
Yellow pine, 4677c.
Yellow race, 4909c.
Yellow rail, 4915c.
Yellow River, 2803b.
Yellows, 4539b.
Yellow Sea, 6388a.
Yellow sponge, 5507a.
Yellowstone Lake, 6391a.
Yellowstone National Park, 4505d, 6388b.
Yellowstone River, 6392b.
Yellow-tail, 3733a.
"Yellow Tiber," 5805b.
Yellow wagtail, 6123a.
Yellow warbler, 6136d.
Yellow water lily, 3506b.
Yemen, Arabia, 309b, 5910a, 6392c.
Yenisei River, 6392d.
Yerba maté, 4486c
Yerkes, Charles Tyson, 6393b.
Yerkes Observatory, 5743c, 6393a.
Yew, 6393b.
Yezidees, 1781a.
Yezo, 3115c.
Yggdrasil, 4233c, 4248c, 6393c.
Yield point, 5592a.
Ymir, 4043a.
Yod, 2900a, 3091a.
Yoho Park, 4507a.
Yokohama, Japan, 6393d.
Yolk of egg, 1960d.
Yonge, Charlotte Mary, 6394a.
Yonkers, N. Y., 6394b.
York, Eng., 6394d.
York, House of, 6395b.
York, Pa., 6396a.
York, Upper Canada, 5840b.
York Factory, 4115b.
York Minster, 6395a.
York Rite, 3681a.
Yorkshire terrier, 5402d.
Yorkton, Sask., 6396c.
Yorktown, Sieges of, 6396c.
Yorktown Centennial Monument, 6097b.
Yosemite Falls, 6216a, 6397b.
Yosemite National Park, 4505d, 6397a.
Yosemite Valley, 6397a.
Yoshihito, Harunomia, 6397d.
Young, Brigham, 3952a, 5415a, 6398a.
Young, Charles Augustus, 6399a.
Young, Edward, 6399b.
Young, Ella Flagg, 6399c.
Young, James, 4485a.
*Young Bull*, 4453.

Young Chevalier, 5593d.
Young Italy, 3084a, 6399d.
Young Men's Christian Association, The, 6400a.
Young People's Society of Christian Endeavor, 1367a.
Young Pretender, 1278c, 5593d.
Youngstown, O., 6401a.
Young Turks, 5914b, 6401b.
Young Women's Christian Association, 6401b.
Ypres, Belgium, 6401c.
Ypsilanti, Alexander, 2607c.
Ypsilanti, Mich., 6402a.
Ytterbium, 1295a.
Yttrium, 1295a.
Yuan Shi-Kai, 1352b, 6402a.
Yucatan, 6402d.
Yucatan Channel, 3775a.
Yucca, 6403b.
Yucca glauca, 6403c.
Yucca gloriosa, 6403c.
Yucca moth, 4743c.
Yuen, 6392d.
Yukon River, 6403d.
Yukon Territory, 6405a.
Yule, 6406a.
Yuma Indians, 6406c.
Yumuri Valley, 1657b.
Yung Cheng, Emperor, 4391c.
Yverdun, Switzerland, 4605b.
Yzabel, Lake, 2632c.

# Z

Z, 6407a.
Zacatecas, Mexico, 6407a.
Zagros Mountains, 4594c.
Zama, Battle of, 2685a.
Zambalist, Mrs. Efrem, 2514b.
Zambezi bridge, 1170a.
Zambesi River, 6407b.
Zamenhof, Lazarus L., 2078b.
Zane, Ebenezer, 6266b.
Zanesville, O., 6407d.
Zangwill, Israel, 6408b.
Zante Island, 3032c.
Zanzibar Island, 6408c.
Zapata, Emiliano, 3777a.
Zapotecas Indians, 3766d.
Zara, 1692c.
Zarephath, 4645a.
Zayas, Alfredo, 1661b.
Zayin, 6407c.
Zealand, Island of, 6408d.
Zebedee, 3156d.
Zebra, 6408d.
Zebra swallow-tail butterfly, facing 1022.
Zebra wolf, 5709b.
Zebu, 419c, 1233a, 1234a, 6409b.
Zebulun, 6409c.
Zedekiah, 6409c.
Zeisler, Fannie Bloomfield, 6409d.
Zelaya, Nicaragua, 3969d.
Zeller See, 1554c.
Zemstvo, 5118d, 6409d.
Zenana, 6410b.
Zend-Avesta, 6410b.
Zenith, 6410c.
Zeno, 6410c.
Zeno, Emperor, 4343a.
Zenobia, 6410d.
Zeoditu, 17d.
Zephaniah, 6411a.
Zephyrus, 841b.
Zeppelin, Ferdinand, 6411a.
Zeppelin airship, 2239d, 6188d.
Zero, 5745a, 6411c.
Zerubabel's temple, 5746b.
Zeta, 6407c.
Zeus, 3190c.
Zeuxis, 4513a, 6411c.
Zinc, 6411d.
Zinc chloride, 6412b.
Zinc etching, 6412b.
Zinc sulphate, 5620a, 6412b.
Zinc white, 6412b.
Zinnia, 6412c.
Zinnia elegans, 6412d.
Zinzendorf, Nicholas, 3946a.
Zion, 3141b.
Zionist Movement, 6413a.
Zirconium, 1295a.
Zither, 6413b.
Zodiac, 439a, 6413c.
Zodiacal light, 6413d.
Zola, Emile Edouard Charles Antoine, 1863a, 6414a.
Zollverein, 216b, 6414d.
Zone, 6415c.
Zones of standard time, 5523b.
Zone system (parcel post), 4491a
Zoölogical garden, 2655d, 6416b.
Zoölogy, 6416b.
Zophar, 3154b.
Zor, Valley of Shechem, 3173a.
Zorka, Princess, 4607c.
Zorn, Anders Leonard, 6418c.
Zoroaster, 6418d.
Zoroastrianism, 6419a.
Zouaoua tribes, 6419b.
Zouaves, 6419b.
Zoutpansberg Mountains, 5863b.
Zug Spitze, 2469b.
Zuider Zee, 6419c.
Zululand, 6419c.
Zulus, 6420a.
Zuñi Indians, 6420a.
Zurich, Lake, 6420c.
Zurich, Switzerland, 6420b.
Zutphen, Battle of, 5373d.
Zuyder Zee, 6419c.
Zwingli, Ulric, 4959c, 6420c.
Zygomatic arch, 2738d.


THE WORLD BOOK


THE WORLD BOOK